TECHNOLOGY DEPARTMENT

The CHEMICAL AGE

VOL LIX 30 OCTOBER 1948 No 1529

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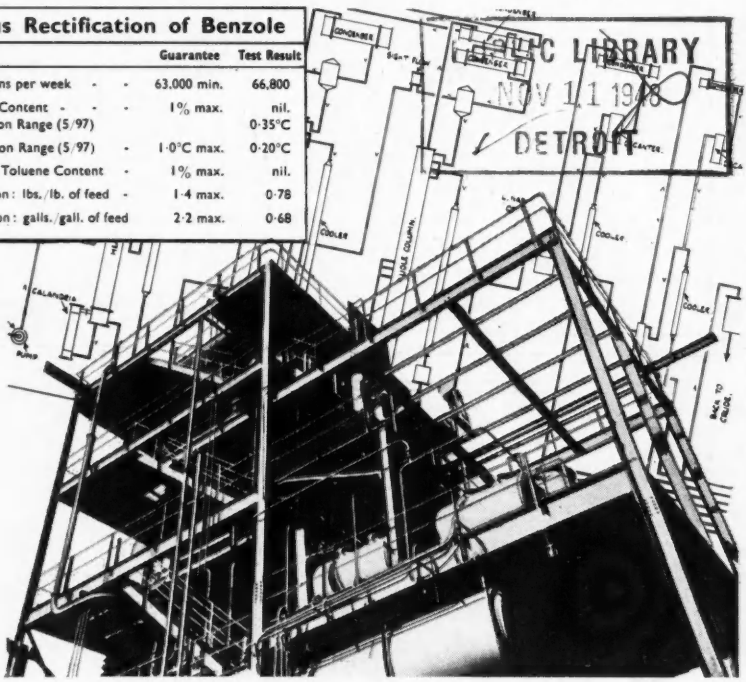
DETROIT

Continuous Rectification of Benzole

	Guarantee	Test Result
Throughput: gallons per week	63,000 min.	66,800
Benzole: Toluene Content	1% max.	nil.
Distillation Range (5/97)		0·35°C
Toluene: Distillation Range (5/97)	1·0°C max.	0·20°C
Solvent Naphtha: Toluene Content	1% max.	nil.
Steam Consumption: lbs./lb. of feed	1·4 max.	0·78
Water Consumption: galls./gall. of feed	2·2 max.	0·68



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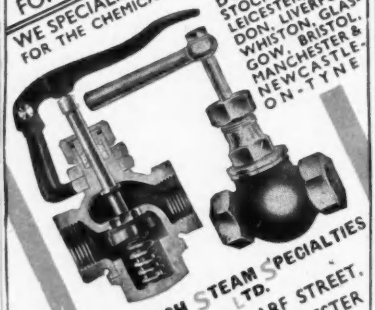

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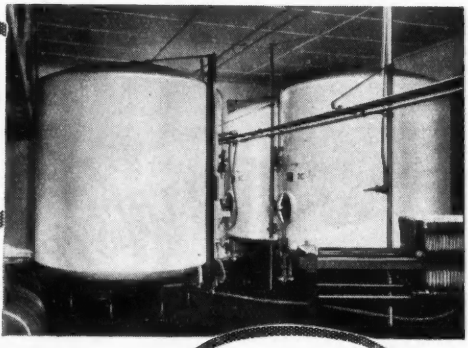

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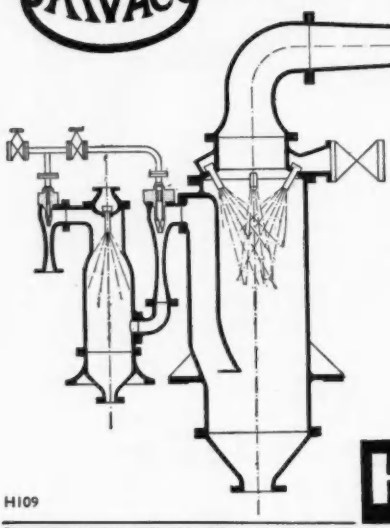

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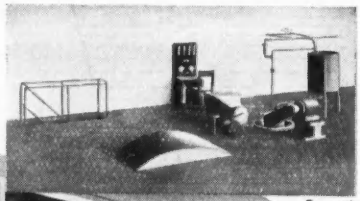
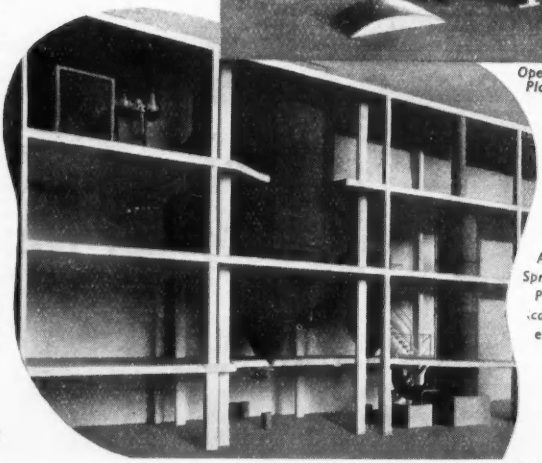


Operating Platform



A large Spray Drier Plant in course of erection

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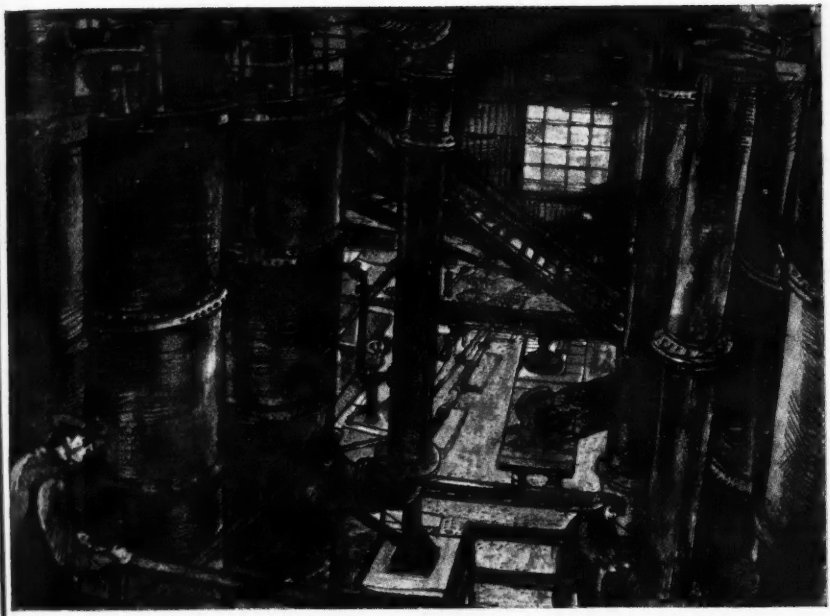

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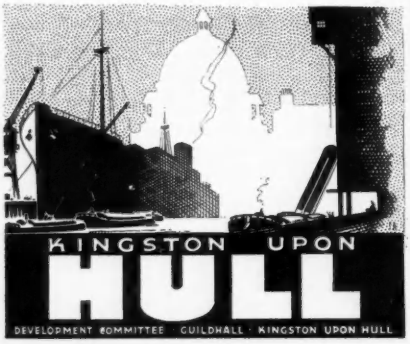

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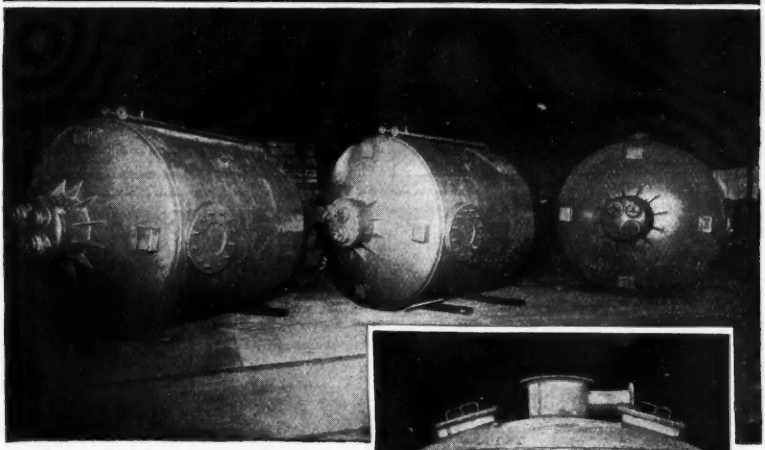

The upper illustration shows a typical WIDNES job—fabricated mild steel viscose kettles, 7 ft. 1 in. diam. by 7 ft. deep on the straight, part of an order for 25, fabricated in accordance with B.S.S.487.

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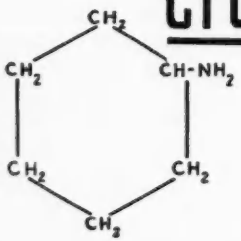

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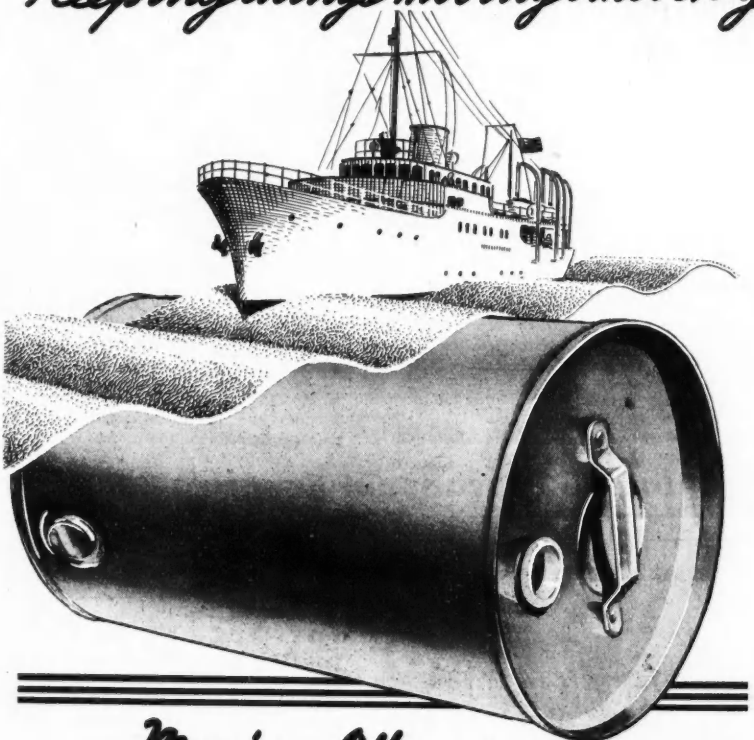

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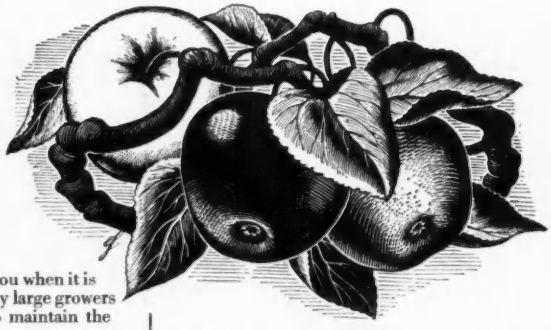

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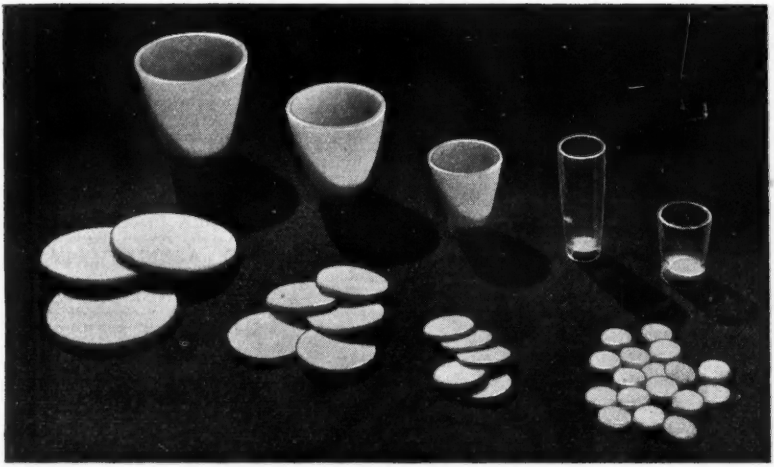

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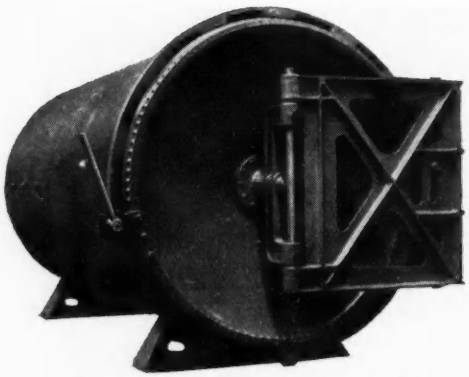

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■ *Ringseals, once locked into position, cannot be removed without first breaking the seal, and once broken, cannot be replaced.*

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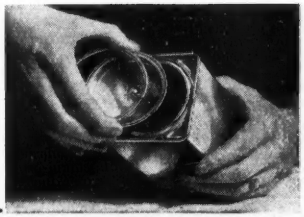
lever lid tins



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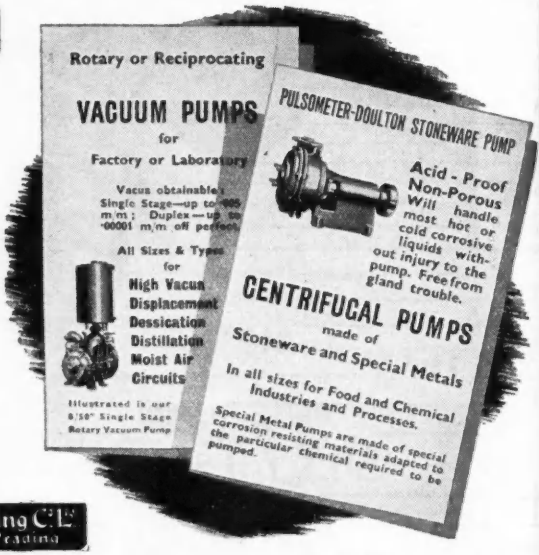
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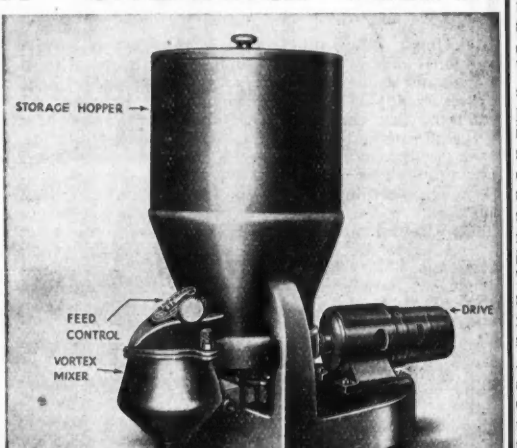

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The Anglo-American Council

THE presence here this week of six representatives of American industrial management and labour and one "neutral," Mr. Stanley A. Holme, to study in conference with their British counterparts means of raising productivity in the United Kingdom cannot fail to stimulate a certain amount of heart-searching among those who are considered answerable for the maintenance of industrial vigour in our main departments of production. While it was perhaps a foregone conclusion that cotton, one of the great preoccupations of the Board of Trade and an industry in which the U.S.A. has every reason to be interested, would be singled out as one of the first subjects for study, the close affinity of chemical industry with this and other basic activities renders it fairly certain that chemical production here will receive some share of attention. The participation of the vice-president of the Association of British Chemical Manufacturers, Sir Frederick Bain, as one of the four FBI members on the Anglo-American committee, seems to be an assurance that the fundamental importance of a fuller output of industrial chemicals will be recognised, and at the same time that what is being achieved and what impedes a very much greater flow of chemical materials will be fairly represented.

It may well be a source of considerable satisfaction to Sir Frederick Bain that he will need to make no apologies on behalf of the chemical industry. The export figures since plants all over the country began their reconversion to supply peacetime requirements are sufficient testimony that industrial chemistry has made exceedingly good use of whatever material was available to it in a severely limited and unbalanced economy. The current returns, showing that in September exports by all the chemical groups were worth £0.5 million more than the very satisfactory total a month before (incidentally compensating exactly the reduction in the same period of sales by the cotton industry) and the unqualified recognition recently given by the President of the Board of Trade of the full contribution which chemicals have made towards balancing the trading account are less than half the evidence that Sir Frederick Bain could produce, had justification been necessary. Direct exports, are not the first claim on the industry and, if it were possible to express in monetary terms the saving in imports, even the £40 million total of exports recorded in the first half of this year would seem trivial by comparison.

In whatever discussions are now in progress of British chemical production in the

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light of American achievement, two facts will be evident. The first is that British chemical industry, using only a very small proportion of the wealth and material lavished in the U.S.A. on advancing technology and "application research," has achieved a greater degree of self-sufficiency than that of almost any other country whose industry had suffered wartime and post-war disruption. The other is that any hopes that may be entertained in American chemical industry of finding widening markets here are likely to be disappointed. Even in the field of petroleum chemicals and industrial solvents, in which the impressive progress by American industry could entitle it to expect precedence as a supplier, current expansion here, although much of it has still to reach the production stage, seems more likely to contract than to expand some existing East-West trading.

The Anglo-American Productivity Council is, of course, not concerned with balancing trading arrangements and conspicuously was not briefed to foster American interests. The Americans are undoubtedly disinterested, in so far as any nation bearing the peculiar responsibilities of the U.S.A. can be to-day.

Mr. Philip D. Reed, the American chairman, and other American representatives on the council, emphasised at the Press conference on Monday that the visits to British industrial plants which would follow this week's meetings in London would not in any sense be investigations or inquiries. He said the U.S. delegates did not claim to be primarily production engineers, but were men with a broad background, who, by seeing something of British industry would be able to equip themselves more intelligently to work out a programme with their British friends on the council. The American side of the council, he said, approached this job with considerable humility. They recognised that they were not familiar with conditions here or the special problems in Britain which had no counterpart in America. But there were indications that there would be areas where they could learn from us and where we could apply some of the American technique and successful experience on production.

Not the least promising result of this new liaison may be the transatlantic exchange of representatives, of workpeople as well as of managements, to see how the other fellow deals with common problems, the possibility of which was referred to by Sir Frederick Bain.

NOTES AND COMMENTS

"Socialising Steel"

OVERSHADOWING all else in the present shape of industrial affairs, the Government's irrational determination to nationalise the steel industry during the current Parliamentary Session strikes a jarring note in the picture which many are contributing to present of united effort towards greater production. It is now inevitable that much Parliamentary time, and effort both inside and outside the House, will be canalised to the campaign to force through a measure which, at the best, is entirely irrelevant to the urgent industrial and economic needs of the moment and, if the experience of State control in another basic industry is any precedent, may have disastrous results in which nearly every major department of production would be involved. While there is, of course, no prospect that the Government will be deflected by any appeal to reason or expediency to defer this testimonial of its faithfulness to party doctrine, the evidence thus afforded of its readiness to set aside all consideration of the immediate needs of the nation is a grotesque commentary on the widespread co-operation to raise industrial output and a very poor compliment to the aid now being proferred by representatives of both sides of American industry. It was noteworthy that the nationalised coal industry has been excluded from the discussions of the Anglo-American Productivity Council.

Motives

NO one has yet had the temerity to claim that by nationalisation the steel industry will be enabled to surpass the mounting production totals which have characterised its performance for more than two years and twice enabled it to surpass the annual production targets. In the absence of any intelligible justification in Parliamentary quarters of what is proposed, the country will be obliged to accept the version offered last week-end by the Labour Party. According to this, iron and steel must be a State industry because it is "basic," is a restrictive monopoly and is not as efficient as it could be. If the validity of those reasons is accepted, an equally good case might well be presented for nationalisation of nearly every other of our essential industries, and especially perhaps of chemical industry—whose intimate dependence upon steel has recently been again brought prominently to the fore. Such a corrollary is doubtless in accordance with the Socialist view of industrial progress in the immediate future. The other view, which observation fully supports, will see in this in this latest tribute to party doctrine grim possibilities of limited output and industrial discontent which could make impossible the achievement of the higher export levels proposed this week.

Sulphurous Smoke

THE country is faced with the necessity of producing more coal; a large majority of the population, both domestic and industrial consumers, knows this and probably believes it. Industrial users, chemical manufacturers and chemical engineers among them, are continually being urged by the fuel authorities—whose theoretical matter is wholly admirable, unlike their administration in the past of the actual material—to economise on coal, one current recommendation being that they should use a greater proportion of lower grade coal. An interesting and informative study of the whole subject of coal utilisation just published by the National Smoke Abatement Society, is "Guilty Chimneys," containing some well authenticated and arresting information on the "heedless extravagance" involved in the present-day general methods of burning coal. and suggests some remedies, of which the treatment of processed fuel rather than raw coal seems likely to receive increasing encouragement from now on. For readers of THE CHEMICAL AGE, who do not require to be told what is involved in the coal combustion processes and the continuing atmospheric pollution with sulphuric and sulphurous and other chemicals, much of the matter in this attractive booklet is, of course, of a kind which, in effect, preaches to the converted. The following extract, however, may well serve as a conclusion toward which all current discussion points: "In present circumstances an increase in coal production is a necessity, but should be regarded only as a temporary and re-

grettable expedient. Scientifically, it is more desirable to employ manpower and materials for a limited period in providing the means to use coal more efficiently than permanently in producing more coal for further wasteful consumption." Few chemical engineers will quarrel with that statement, but they are well entitled to ask that the contribution by domestic consumers to fuel economy and reduction of broadcasting of chemicals *via* the chimney should now be raised to a level approaching what has been done in industry. Of the 2.4 million tons estimated to be emitted yearly domestic and other small users are held to be responsible for 1,290,000 tons. General industry is " in the black " only to the extent of 700,000 tons.

Good Publicity

HOW effective an instrument of propaganda a specialised periodical can be, not only for its own trade, but for its country, is well shown by the *Czechoslovak Glass Review*, published every second month. The current issue maintains the usual high standard; it is well-printed on high quality paper, with excellent half-tone blocks in black and white and sepia, and one full-page in colour. This raises the interesting problem of representation of our own industries abroad. Can the glass industry, for instance, send to Europe printed in the language of the country concerned, any kind of publication capable of upholding the prestige of any one English craft, as effectively as does the *Czechoslovak Glass Review* for its own industry? Here perhaps is an instance in which the Arts Council of Great Britain might aid the country's exports by helping the various trades and crafts to be appreciated overseas.

Too Efficient

STANDING, it might seem, as a footnote to underline the extremities of absurdity that may be reached once the principal of private enterprise has been condemned by the administration is the recent prosecution in Leeds, which in itself, has nothing to do with chemical industry. The victim was a Leeds clothing firm which has been fined £5000 for earning a profit higher than the margin fixed by the Board of Trade, despite the fact that its goods were sold below the regulation prices. Such a paradox might well have been conceived by the late W. S. Gilbert, but as a commentary on the current official demand for greater efficiency here, there and elsewhere it is a grim joke.

1949 Target for Chemical Exports

THE intensification in 1949 of obstacles to continued expansion of United Kingdom export trade is foreseen in this week's statement by the Board of Trade in which it is announced that the level expected to be reached by exports as a whole by the end of that year is 55 per cent more than that ruling in 1938. The level tentatively proposed six weeks ago by the President of the Board of Trade was 5 per cent higher (160 per cent of the 1938 figure).

The figure now proposed for " chemicals, etc." by the end of next year is £9 million monthly, equivalent to 206 per cent of the exports prevailing in 1938. The corresponding figures for the current year are £8.05 million and 184 per cent.

The BoT statement mentions that " The end-1948 target of 150 per cent of the 1938 volume is within sight of achievement. Most of the export categories are expected to record further increases during 1949, but in some cases the targets have had to be reduced below the end-1948 figures, largely because of severe import restrictions abroad and growing competition for overseas markets.

" In certain cases, we shall still be unable to meet the full demands of our overseas customers, owing to the continuing shortage of raw materials—a consideration which applies particularly to the engineering industries (due to steel shortage), as well as to exports of chemicals, coal, food, drink and tobacco. In this connection defence may further limit the availability of scarce materials for use in export industries."

Among the figures now published, representing " the Government's preliminary views of the targets to be achieved by the main groups of industries," are the following: Coal, £6 million monthly, representing 57 per cent of the 1938 figure; iron and steel manufactures, £8.5 million (116 per cent); non-ferrous metals and manufactures, £4 million (182 per cent); machinery, £24.48 million (228 per cent); silk and rayon, £4.5 million (251 per cent); chemicals, £9 million (206 per cent); coke and manufactured fuel, £600,000 (75 per cent); oils, fats and resins, £1.3 million (121 per cent).

CHEMICAL EXPORTS RISE AGAIN

September Total was £875,091 More Than Last Year

BRITISH chemical manufactures exported in September, excluding drugs and dyestuffs, reached the high total value of £4,334,005, which represents an increase over August of £186,336 and £875,091 more than the figure for September, 1947. Sodium compounds again showed a substantial export rise, sodium carbonate registering 334,828 cwt. (September, 1947, 243,320 cwt.), caustic soda 258,370 cwt. (97,459), sodium silicate 23,920 cwt. (4378 cwt.). Coal showed proportionately the largest individual increase with 1,066,972 tons (£3,939,351) compared with the very low level of 113,935 tons (£251,397) in September, 1947. Exports of potassium compounds were more than doubled by comparison with 1947, totalling 11,367 cwt.

CHEMICAL EXPORTS

	Sept. 1948	Sept. 1947
	Cwt.	Cwt.
Formic acid	3,286	1,836
	Lb.	Lb.
Salicylic acid and salicylates	254,382	148,814
	Cwt.	Cwt.
Tartaric acid	2,398	234
Value of all other sorts of acid	£67,820	£61,987
	Tons	Tons
Aluminium oxide	125	1,010
Sulphate of alumina	2,034	2,269
All other sorts of aluminium compounds	445	355
Ammonium sulphate	33,057	35,267
Ammonium nitrate	6,538	5,232
All other sorts of ammonium compounds	1,957	1,619
	Cwt.	Cwt.
Bleaching powder	60,076	43,457
All other bleaching materials	17,707	4,590
Calcium carbide	10,271	6,119
	Gal.	Gal.
Benzol	290	9,198
Cresylic acid	168,020	200,397
Tar oil, creosote oil, anthracene oil etc.	2,810,660	1,172,900
Value of all other sorts of tar oil	£26,832	£46,194
	Cwt.	Cwt.
Naphthalene	6,684	1,780
Colliodion cotton	1,283	1,505
	Tons	Tons
Copper sulphate	435	946
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	62,706	87,996
	Tons	Tons
Fertilisers	1,756	745
	Cwt.	Cwt.
Glycerine	3,339	343
Nickel salts	5,350	2,479
Lead acetate, litharge, red lead, etc.	8,223	3,402
	Tons	Tons
Magnesium compounds	797	662
	Gal.	Gal.
Methyl alcohol	13,404	157,455
	Cwt.	Cwt.
Potassium compounds	11,367	4,980
	Tons	Tons
Salt	21,316	13,210
	Cwt.	Cwt.
Sodium carbonate, etc.	334,828	243,320
Caustic soda	258,370	97,459
Synthetic sodium nitrate	2	20
Sodium silicate	23,920	4,378
Sodium sulphate	16,089	16,026
All other sodium compounds	89,171	77,313
Cream of tartar	92	321
Tin oxide	359	635
Zinc oxide	1,768	923
Total value of chemical manufactures, excluding drugs and dyestuffs	£4,334,005	£3,458,414
	Oz.	Oz.
Quinine and quinine salts	192,206	182,001
	Lb.	Lb.
Acetyl-salicylic acid	118,051	88,427
	100	100
	International units	International units
Insulin	753,192	133,404
	Mega units	Mega units
Penicillin	323,340	172,042
Total value of drugs medicines and preparations	£1,380,326	£1,391,129
Total value of dyes and dyestuffs	£761,304	£653,704
	Cwt.	Cwt.
Plastic materials, other than casein and celluloid, etc.	32,792	22,445
Value	£407,326	£255,637
	Cwt.	Cwt.
Chemical glassware	1,279	1,117
Value	£45,513	£40,534
	Tons	Tons
Furnace plant	258	1,333
Value	£58,664	£140,775
	Tons	Tons
Coal	1,066,972	113,935
Value	£3,939,351	£251,397

CHEMICAL IMPORTS

	Sept. 1948	Sept. 1947
	Cwt.	Cwt.
Acetic acid	15,851	9,886
Boric acid	4,930	4,500
Tartaric acid	—	700
All other acids	3,216	1,364
Borax	22,950	36,600
Bromine and bromides	—	2,107
Calcium carbide	31,535	393
Coal tar products, excluding benzol and cresylic acid	10,442	3,736
Cobalt oxides	603	644
	Tons	Tons
Ammonium phosphate	—	—
Arsenic	570	552
Fertilisers	9,983	4,718
	Lb.	Lb.
Iodine	—	—
	Cwt.	Cwt.
Potassium chloride	801,136	576,881
Potassium sulphate	8,576	38,340
All other potassium compounds	5,371	6,821
Sodium nitrate	69,790	—
All other sodium compounds	6,777	18,710
Carbon black	106,567	106,415
Total value of chemicals, drugs dyes and colours	£2,692,196	£2,243,137

Anglo-American Productivity Council

Industrial Discussions Opened in London

SIR FREDERICK BAIN, M.C., president of the Federation of British Industries and vice-president of the Association of British Chemical Manufacturers, took the chair at the Press conference in London last Monday which followed the first meeting of the Anglo-American Productivity Council. The American members of the council are to stay in Britain a fortnight.

Sir Frederick Bain, who is also joint chairman of the British section of the council, said it had been decided that the council's terms of reference should be to exchange views on the ways, through ERP and otherwise, in which U.S. industry could co-operate in assisting British industry to promote greater productivity.

Capital Equipment

Among the subjects discussed at the council's meeting that day, he said, had been capital equipment, investment and so on, quantity versus quality production, the meaning of productivity in relation to output, production costs and the general questions of specialisation and standardisation.

Questions were invited, and answering one of these, Sir Frederick Bain said it was quite likely that British members of the council would be paying a return visit to America. It was also likely that some British workers would be going to the U.S.A. An exchange of workpeople between the two countries was definitely going to be considered. No details had been decided, but the Americans were in favour of British workers gaining experience in their factories.

Mr. Philip D. Reed, chairman of the U.S. section and other American representatives on the council, emphasised that the visits to British industrial plants which would follow this week's meetings in London would not in any sense be investigations or inquiries. Mr. Reed said the U.S. delegates did not claim to be primarily production engineers, but men with a broad background, who, by seeing something of British industry, would be able to equip themselves more intelligently to work out a programme with their British colleagues on the council. The American side of the council approached the job with considerable humility.

The work of the council was not a question of miracles; production never was. It was really a case of a great many approaches carefully and methodically carried out. They recognised that they were not familiar with conditions here and the special problems in Britain which had no counterpart in America. But there were indications that there would be areas where they could learn from the British and where the British could apply some of the American technique and successful experience on production.

Mr. J. Spencer Love, an American textile representative, said that, while there were many differences between the British and American industries, it was his belief, that, given the same raw materials, the same machinery, the same leadership and the same incentives, British industry could vie with any other in the world.

Questions were asked about the position of the nationalised industries in relation to the council's inquiries, it being pointed out that there were no representatives of the management of any nationalised industry on the British side of the council, which represented solely the TUC, the FBI and the British Employers' Confederation.

Sir Norman Kipping, director-general of the FBI, and one of the three joint secretaries of the council, said they were concerned mainly with discussing productivity in an industrial sense, and such things as transport and electricity came rather outside the scope of this. Coal was the only nationalised industry with the sort of problems that the council would be discussing, but it had been decided not to deal with coal. But they would try to study a representative cross-section of British industry apart from coal.

WORK ON ALIZARIN

ENGLISH and American scientists, working together in the United States, are reported to have found a new process that promises to increase production and relieve the current shortage of alizarin-type dyestuffs. Using simple and inexpensive equipment, the scientists are stated to have fused a material called "silver salt" with lye in the presence of kerosene. A simple distilling kettle, functioning at ordinary pressures, removed water from the product. Even with present mass production techniques, two days are required to produce dye from alizarin, but with the new and cheaper method the co-operating scientists are stated to have produced it in a few hours. Among those co-operating in the work were Indian-born Dr. Vaman R. Kokatnur, an industrial chemist who holds many chemical patents in the U.S.A., and Mr. Siddarth Lalbhai, the son of a leading textile manufacturer in India, who has now returned to his native land after doing graduate work in the U.S.A.

BRITISH SURVEY OF U.S. INDUSTRY

Heavy Chemical Production and Prospects

H.M. Stationery Office has just sold out a "best seller," compiled by 25 Britons in the Washington Embassy under the direction of Sir John Magowan, the British Commercial Minister to the United States. It is an economic survey of the United States completed in February last.

The bibliography lists 67 sources of information besides the official help the mission received from U.S. government departments, in the production of this 207-page book, the aim of which is to help British industry to earn dollars.

Hard facts are not evaded in the section reviewing British industrial marketing policy. Industrialists are told to "go and see for yourself; send your workpeople as well as your salesmen. Give service; co-operate; advertise; keep landed prices low and quality high. You have to sell in competition with the keenest and most efficient large-scale manufacturers of the world in their own vast home market." And much more.

There is in addition a mass of carefully pruned and selected information, qualified by the admonition: "Reports . . . . cannot carry the same conviction as personal experience and observation."

Discussing the potentialities of the chemical industry of the U.S.A. it is stated that the estimated 2.4 billion dollars worth of extra plant built for the Government is largely a reflection of new technical development rather than a duplication of existing plant. The examples given lay emphasis on the development of chemicals from petroleum instead of from coal and the virtually new development of magnesium production from seawater.

Outlet for Surplus

Fears that U.S. civilian market would not be able to absorb the swollen productive capacity of the war were soon dispelled, say the experts. "The high level of industrial and agricultural activity since the war has kept basic chemical plants working at as near full capacity as supplies of labour and materials allowed.

"Demand has been particularly heavy on fertiliser manufacturers, oil refineries, the paper and pulp industries, rayon, and plastics producers and the glass using industries and further plant expansion has been undertaken on a considerable scale.

"New plant construction on a large scale is normal in the chemicals industry on account of the high rate of obsolescence caused by technological advance.

"At present the need for new capacity is being considerably accelerated by the general change in the nature of the industry.

"Whereas before the war the industry was largely engaged in producing chemicals required for the processing of other commodities, it is now, to a considerable extent manufacturing such commodities as plastics, rayon and synthetic rubber which are themselves end products and bulk materials."

Volume of Chemicals

So the British experts, recalling the considerable expansion undertaken during the war to meet the U.S. chemical requirements for ordnance factories, synthetic rubber and chemical warfare, point out that the U.S. during 1946 and 1947 has been through many shortages and production difficulties. They give an indication of the volume of production of some of the more important chemicals over 1944-7 in this table form:—

	1944	1945	1946	1947
	(Million Gal.)			
Creosote oil	163	162	142	161
	(Million Lb.)			
Glycerine, refined high gravity and yellow distilled	97	90	64	92
Glycerine (chemically pure)	99	84	84	100
Acetic acid (synthetic and natural) ...	332	293	313	386
Acetic anhydride ...	494	526	522	624
Carbon dioxide	893	871	862	967
	(Thousand Short Tons)			
Synthetic anhydrous ammonia	541	549	726	1,088
Nitric acid	471	447	574	796
Phosphoric acid ...	692	718	901	1,038
Sodium silicate	428	411	412	476
Sulphuric acid	9,262	9,553	9,318	10,553
Sodium sulphate, Glauber's salts and salt cake	800	755	695	825

At the end of 1947 the supply of most basic chemicals in the U.S.A. was below current demand, while production difficulties were encountered, such as uncertainties of coal supplies (affecting principally organic chemicals and industrial alkalis), transport and labour difficulties.

One of the worst shortages (persisting throughout 1947) was of soda ash, caustic soda and chlorine. Demand for these had been particularly high because of the needs of the glass industry (normally consuming 30 per cent of total soda ash supplies) and the paper, textile, aluminium, petroleum products and other chemical industries.

Another shortage of post-war—of carbon

(*Continued overleaf*)

U.S. Seeking Strategic Materials

Details of Munitions Board's Prospective Purchases

THE realisation by America of the need to maintain and increase her strong and strategic position is emphasised by a report dated September 13 from Mr. W. D. Wallace, Assistant Commercial Secretary to the Canadian Embassy in Washington (*Foreign Trade*, October 2). Provision for purchases amounting to $300 million has been made for the Munitions Board to accumulate essential defence materials. Only $87 million have been spent to date but it is proposed that goods for the remaining $213 million shall be obtained during the present fiscal year.

The present three-month purchase plan calls for delivery before June 30, 1949, of commodities in substantial amounts to be contracted for in this quarter. These items are shown in the accompanying table.

Under provisions of the Economic Co-operation Act, the ECA is authorised to use at least 5 per cent of its currency accounts in ERP countries to purchase materials for the stockpiling programme. The Director of the Strategic Materials Division of ECA recently visited Europe to see whether the production of raw materials could be increased to allow some to be exported to the U.S.A. Among the materials under discussion were manganese, rubber, tin, copper, zinc, hemp and sisal, industrial diamonds, nickel, graphite, talc, uranium, tungsten, vegetable oils, chrome and quinine. An agreement was concluded with the United Kingdom to purchase 25,000 tons of high-grade rubber and 2000 tons of sisal. A number of critical materials are not being accumulated because storage problems outweigh the advantages of storing them. Among these are radium, uranium, certain types of asbestos, optical glass, leather, iron ore and petroleum products.

Asbestos	
Chrysotile	1,100 short tons
Amosite	1,900 „ „
Bauxite	
Metal grade	435,000 long dry tons*
Abrasive grade	68,000 „ „
Beryl	250 short tons
Bismuth	100,000 lb.
Cadmium	300,000 „
Castor Oil	15,000,000 „*
Chromite	
Metallurgical	30,000 long dry tons*
Refr. Type A	1,250 „ „
Coconut Oil	5,000,000 lb.
Columbite	1,100,000 „*
Copper	30,000 short tons (from commercial channels)
Graphite	
Amorphous lump	1,000 short tons*
Flake (crucible)	300 „ „*
Flake (lubricant)	500 „ „*
Kyanite	1,000 short dry tons
Lead	16,000 „ „ „
Manganese Ore	
Battery	20,000 long dry tons*
Metallurgical	350,000 „ „ „
Mica	
Muscovite block	80,000 lb.*
Muscovite film	125,000 „*
Muscovite splittings	1,000,000 „*
Phlogopite splittings	120,000 „*
Monazite	500 short dry tons*
Nickel	15,000,000 lb.*
Palm oil	7,000,000 „ *
Pepper	1,000,000 „ *
Quinidine	6,000 oz.
Natural crude rubber	25,000 long tons (from commercial channels)
Shellac	1,500,000 lb.
Talc, block	250 short tons*
Tin	4,500 long tons*
Zinc	16,000 short tons

*Expected total for the year

BRITISH SURVEY OF U.S. INDUSTRY

(*Continued from page 581*)

black—was principally the result of unprecedented demand for rubber tyres.

Between September, 1945, and December, 1947, general chemicals showed a 29 per cent price rise and in the fertiliser materials section prices rose 41 per cent.

In plastics, the British experts forecast a rapid development of demand from the automobile and textile industries.

"An interesting development beginning to take place in the industry is the bridging of the existing gap between thermoplastic and thermosetting materials. The advantageous higher molding speeds enjoyed by thermoplastics are now being approached by some of the thermosetting materials while the great heat resisting properties of thermosetting plastics are being, to some extent, developed among the thermoplastics."

OEEC PRODUCTION PLAN

A EUROPEAN recovery programme for the year July 1, 1948, to June 30, 1949, to be carried out with the estimated Marshall Aid of $4875 million (£1219 million), to be made available during this period, has been handed by the Organisation for European Economic Co-operation to Mr. Averell Harriman. The proposed increases in production under various categories, expressed as percentages, are as follows: Coal, 13.7; steel, 50; pig iron, 68; petroleum, 39; aluminium, 37; copper, 16; lead, 78; zinc, 45; tin, 38 nitrogenous fertilisers, 27; potash, 29; bread grains, 45; beet sugar, 26; wood pulp, 23; electric power, 10. The production of rock phosphates in North Africa will be 170 per cent greater than the average annual production in 1935 to 1938.

Nationalising Steel

Bill Published This Week

THE main legislation in the new session of Parliament is the proposal to nationalise the steel industry referred to in the King's Speech as "A measure will be laid before you to bring under public ownership those companies extensively engaged in the production of iron ore, or of pig iron or steel, or in the shaping of steel by a rolling process."

Mr. Eden, speaking for the Opposition, emphasised that they were unalterably opposed to the proposal of nationalisation. The Government's action, he said, was ill judged and ill timed, and they would do all they legitimately could in the House to resist the passage of the Bill. Should the measure become law in the life of the present Parliament, it would, of course, be an issue at the next General Election. He took the opportunity to make it absolutely clear that, should the Opposition be victorious at the polls, they would consider themselves entirely free to repeal any such legislation.

FILTER MEDIA STANDARDS

THE British Standards Institution has published B.S. 1438 : 1948, which prescribes the requirements for media used in biological percolating filters for treatment of sewage, water, and certain trade waste waters.

The function of the medium in a percolating filter is to provide an extended surface to serve as a support for the organisms, including bacteria and fungi, which bring about the purification of polluted liquids supplied to the filter. Many different materials have been used satisfactorily as filter media including coke, clinker, gravel, crushed stone, and slag.

Experience has shown that the most important factors governing the suitability of medium for use in a percolating filter are durability, uniformity of size, shape of the pieces of medium, cleanness, nature of surface, chemical inertness, and mechanical properties. The specification makes provision for assessing these qualities and provides methods of sampling, of analysis and of testing.

At present there is a lack of quantitative data on some of these factors and it is not yet possible to lay down rigid requirements for all of them. Further experience in the field may make it desirable to amplify the present standard at a later date.

Copies of the standard may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, S.W.1 (2s. 6d. post paid).

More German Dismantling

I.G. Farben Equipment Scheduled

NOTING that there is an important distinction between "will be allocated" and "declared available for reparation from Germany," the Office of International Trade of the U.S. Department of Commerce announced last week that in the near future the Inter-Allied Reparations Agency will allocate as reparations among the Western Allied Nations, including the U.S.A. 23 German war and industrial plants. Among them are several suitable for the production of chemicals and allied products. These and their location and production facilities, are :—

Beulter und Co., Lahr (Dinglingen), activated carbon; Chemische Fabrik Weinheim, Ingelheim am Rhein, activated carbon; I. G. Farben, Ludwigshafen, pyrrolidone (complete shop); I. G. Farben, Ludwigshafen, amino sulphonic acids (part of shop); I. G. Farben, Ludwigshafen, liquid sulphur dioxide (part of shop, fabrication and liquefaction from sulphuric acid); I. G. Farben, Ludwigshafen, anhydrous aluminium chloride (part of shop comprising one refining installation); and I. G. Farben, Appau, formamide (less than a complete section without distillation; production is by reaction of ammonia on methylformiate, produced by reaction of carbon oxide on methanol).

Among the remaining plants, suitable for the production of armaments, metallurgical products, optical instruments, machine tools, hoists and winches, boilers and radar equipment, are the following :—

Gusstahl Fabrik Fr. Krupp, with two machine shops, at Essen; Dynamit A.G., Empelde-Hannover; H. Walter K. G., Beimoor Weg, und Hagen, Ahrensburg; Maschinen fuer Massenver-packung G.m.b.H., Luebeck; J. Sohneider Optische Werke, Goettingen-Weende; Duerkopp Maschinenbau G.m.b.H., Kuensbeck, near Bielefeld; Espera-Werke A.G. (Wilhelm Rheinhold), Wanne-Eickel; Franz Berrenberg, Haan; Lauf, Bungert and Winneberg K.G., Muehlheim-Ruhr; Roehren und Schweisswerke, form G. Kunze, Herne; Albert Schaefer, Recklinghausen; Danzingerweft, Hamburg; Th. Rose K.G., Hamburg-Altona; Funkstrahl, Konstanz; and I.G. Farben at Ludwigshafen, in addition to the I.G. Farben plants mentioned above.

New Carbon Black Project

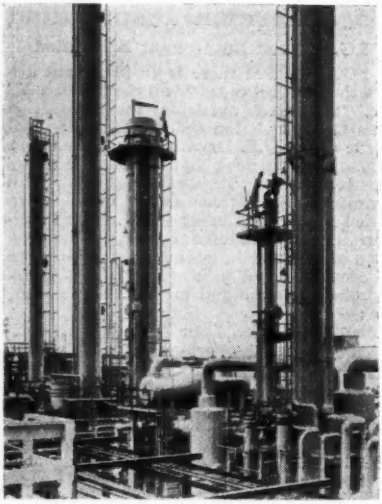
Referring to the carbon black factory to be built on Merseyside (THE CHEMICAL AGE, October 23), Godfrey L. Cabot, Inc., of Boston, Massachusetts, U.S.A., disclosed last week that several River Mersey sites were under consideration.

A Board of Trade official in London said that, contrary to general belief, the factory would be relatively small. It will employ approximately 100 workers and constructional work will begin early next year.

FIRST SYNTHETIC GLYCEROL PLANT

Basis of Innovation

From a Special Correspondent



Distillation equipment used at Houston in the production of allyl chloride

ON September 16, 1948, the Shell Chemical Corporation opened officially the world's first synthetic glycerol plant at Houston, Texas. This marks the first time since its discovery by Scheele, 170 years ago, that glycerol has been made commercially by synthesis.

Employed in the manufacture of high explosives, surface coatings, and some 1500 other applications, glycerol has become a heavy chemical in its own right whose availability as a by-product of soap manufacture may no longer be looked upon as a satisfactory sole source of supply. Its synthesis or preferential production from non-animal origin has been attempted in a number of ways. These attempts range from the classical German glycerol production by fermentation during the first World War to laboratory syntheses from vinyl chloride, formaldehyde, allyl alcohol, etc.

The process employed in the 88 million plant of the Shell Chemical Corporation starts from propylene which can be produced in huge quantities from petroleum hydrocarbons. The synthesis can be brought about by two routes involving similar techniques and showing nearly the same economy. (*see formulæ below*)

In both cases the most difficult step is the economical production of allyl chloride and the solution of this problem is perhaps the most important single development incorporated in the new plant.

Development of the entire process represents the fruit of nearly 10 years' study in the laboratories and pilot plants of Shell. It is expected that the present plant will be able to operate economically and compete successfully with the production of glycerine by the splitting of animal fats.

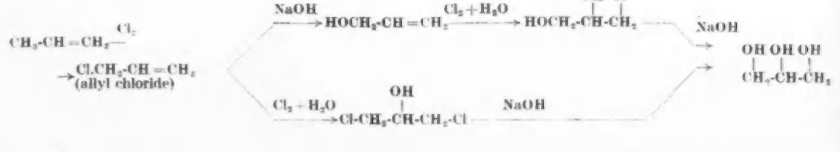
The margin of profit is, however, not great and optimum conditions had to be carefully established. An excellent report on the development of this process has been published by E. C. Williams (*Trans.A.I.Ch.E.*, *37*, pp. 157 ff.).

The production of allyl chloride from propylene is a somewhat unusual reaction. All the textbooks assure us that chlorine will attack the double bond of olefines preferentially. Shell learned to chlorinate the methyl group of propylene by operating at elevated temperatures and in the absence of a catalyst. Temperatures of 500° C. and higher are required for this reaction.

A suitable excess of propylene is maintained, the mole ratio of propylene to chlorine being about 7 : 1. Yields of allyl chloride as high as 85 per cent can be obtained. The remainder consists chiefly of dichloride as well as a α- and β-chloropropylene.

For the production of allyl chloride, propylene of 98 per cent purity is quite satisfactory. This grade is, of course, easily obtained by rectification of cracked refinery gas. As long as the temperature is kept between 500° and 580° C., the reaction time is not critical and considerable freedom is therefore given in the design of the reaction chamber.

The reaction products are first freed of hydrogen chloride by water scrubbing. The organic chlorides are removed by a kerosene wash and are then separated by fractionation. The residual propylene is recycled to



the chlorination reactors, which it enters, preheated to 400°C. by the outgoing products of the reaction.

The hydrolysis of allyl chloride to allyl alcohol is carried out continuously at 150-160°C. A pressure of about 200 lb. p.s.i. is necessary in order to maintain a liquid phase. The allyl chloride concentration in the aqueous solution is of greatest importance. If it is too dilute, the reaction equipment will be unduly large and recovery costs of the alcohol may well become excessive. On the other hand, a concentrated solution will result in large formation of diallyl ether. The optimum concentration is determined by compromise and is about 1.25N, *i.e.*, corresponding to about 5 per cent NaOH as the hydrolysing medium.

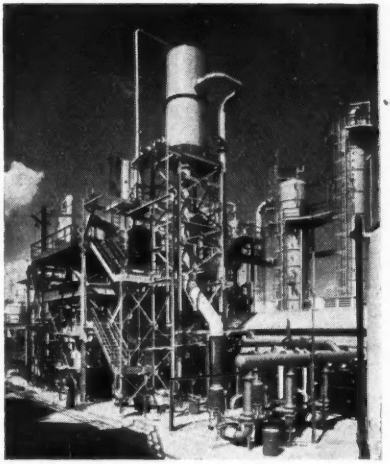
The third factor of prime importance in the hydrolysis reaction is the alkalinity of the solution. By using sodium carbonate instead of sodium hydroxide, the ether formation is successfully repressed well below 10 per cent. However, the evolution of CO_2 results in undesirably high pressure. Only a small amount of sodium carbonate is therefore employed and the proper *p*H is restored by successive additions of caustic soda, to keep CO_2 in solution. An alcohol yield of more than 90 per cent can be obtained. The allyl alcohol is readily recovered in its azeotropic (71 per cent) composition by simple stripping.

The design of the hydrolysis reactors must be carefully handled. There must be no overhead pockets in which allyl chloride can collect. A local accumulation of allyl chloride would result in sufficient hydrolysis and local acidity to introduce a serious corrosion problem.

The allyl alcohol is readily chlorohydrinated in dilute solution by contact with gaseous chlorine. Because of the exothermic nature of this reaction, which is controlled at 20-25°C., provision must be made for removing the heat evolved. This can be effected by trickling the aqueous allyl alcohol solution through a chlorine filled tower and recycling part of the product after intermediate cooling in a shell-and-tube heat exchanger. Starting with a 5 per cent solution of alcohol in water, 92 per cent yields of the chlorohydrinated allyl alcohol are readily obtained.

The product of this reaction is hydrolysed without intermediate purification. Aqueous alkali containing 10 per cent NaOH and 1 per cent Na_2CO_3 gives the best results. Preferred operating temperature is 150°C. with a contact time of 30 minutes. About 95 per cent yield can be attained in the hydrolysis.

The crude glycerol is concentrated to 85 per cent in flash evaporators. Further purification to 99 per cent is effected by a combination of solvent extraction (with xylene) and vacuum fractionation.



The initial concentrating and desalting equipment in the preparation of a semi-concentrated glycerine

The alternate and equally effective method for the production of glycerol from allyl chloride, as outlined in the set of equations shown, has also been worked out by Shell. The allyl chloride is directly chlorohydrinated. By close control of the *p*H and by avoiding the presence of gaseous chlorine in the system, it is possible to get yields of glycerol dichlorohydrin in excess of 95 per cent.

Glycerol dichlorohydrin can be hydrolysed in essentially the same manner as the chlorohydrinated product of allyl alcohol. In the present case, it is, however, equally possible to effect one-half of the hydrolysis by treatment with lime in a stripping column. The resulting glycerol epichlorohydrin is distilled overhead and is readily hydrolised to glycerol by treatment with caustic soda and soda ash. This process results in a saving of nearly one-half of the caustic consumption by the substitution of lime.

The glycerol manufactured by the Shell Chemical Corporation meets the very stringent specifications of the U.S. Pharmacopeia. The material is water-white, odourless, and assays more than 99 per cent glycerol.

The availability of a competitive process for the manufacture of synthetic glycerol will, without a doubt, have important economic consequences. Its further development will tend to stabilise the glycerol supply and price and make it less dependent on the vagaries and fluctuations of the meat packing and soap industries.

Forming Ceramic-Metal Compounds

The Use of "Cermets" in Jet Engines

A SUBJECT of increasing interest to chemical engineers and to those concerned with jet-engines is the employment of ceramic-metal compounds, to describe which the word "cermets" has been suggested.

The term is meant to include not only oxides and metal combinations, but any mixtures such as oxides, carbides, nitrides, borides, and silicates on the one hand, and metals and alloys on the other, states G. A. Bole, Research Professor of Ceramics at the Ohio State University Engineering Experiment Station, in an article entitled "Cermets" in the (U.S.) *Ceramic Forum*.

High Temperature Combination

"Cermets," he writes, are the result of the wedding of ceramics with the metals. The combination of the two takes place at high temperature under controlled atmosphere. The reaction of these two dissimilar materials produces a product that has properties quite different from each alone. The metals are malleable, while ceramics are brittle. The "cermets" are much less brittle than the ceramic constituent, but distinctly less malleable than the metals.

The ceramic components are quite resistant to oxidation at high temperatures, while the metals are subject to oxidation. Intergranular corrosion is a disease of metals at abnormal temperatures, while the ceramics are highly resistant to high temperature breakdown. "Cermets" are resistant to oxidation and apparently resistant to intergranular corrosion.

The spall resistance of ceramics is very poor, while the metals resist heat shock ideally. The "cermets" lie between these two values. They will actually become stronger on heat treatment, but the best of the "cermets" have only a fraction of the strength of the metals at room temperatures. The outstanding property of "cermets" is that they have a strength at high temperatures in advance of the constituent metals, and are nearly as strong as the constituent oxides.

The techniques used in forming the laboratory specimens more nearly resemble those of powder metallurgy than ceramics. We have found it necessary to control the furnace atmospheres very carefully. These atmospheres vary all the way from a slightly oxidising to a highly reducing atmosphere. Other techniques are employed *in vacuo*. The various gases used may be argon, helium, nitrogen, hydrogen, and water vapour when a slightly oxidising atmosphere is desired.

All metals have a characteristic and measurable vapour pressure far below their melting points. Advantage has been taken of this fact in the coating of both metals and oxides. In the laboratory, the reaction is carried out under a bell jar in a nearly perfect vacuum. In this way, an extremely even coating can be produced. When an oxide and a metal are vapourisable at the same temperature, a coating can be laid down constituting a "cermet." Other techniques are employed when the vapour pressure of the oxide and the metal are at different intensity.

One manufacturer is impregnating a ceramic with a metal in the liquid phase, thus producing a "cermet" with a high strength at elevated temperatures. The vapour phase reaction is probably a factor in this process, also.

Coatings have been developed and bodies built up by flame spray techniques for laying down and for flame curing "cermets." From these illustrations, it is evident that "cermets" can be produced in various ways, and it is likely that many more processes will be developed as time goes on. Any one or all of these techniques give promise, each where a particular set of conditions is required.

Establishing a Bond

Any method of forming, to be successful, must take cognisance of the idea that there must be a bond between the ceramic and the metal. This is the crux of the development. Years ago, the enamellers were faced with the same problem of establishing a bond. Recently a company making enamel specialities noted that the metal stock, with a very slight degree of oxidation, enamelled better than a brilliantly clean metal.

It is now found that an atmosphere containing a few molecules of oxygen per million parts of atmosphere (gas) is required to produce a satisfactory bond. In the development of "cermets," it is evident that there is a very large number of combinations with special properties that can be produced by varying the available components with a wide variety of atmospheres and firings on various heat schedules.

Ideal Home Exhibition.—The 26th *Daily Mail* "Ideal Home" Exhibition will be held at Olympia from March 1 to March 26, 1949.

GERMAN VISCOMETRY

New Apparatus for Very Heavy Liquids

THE investigation of viscosity and flow of very viscous liquids and plastic masses, *e.g.*, oils and fats, at normal or low temperatures, requires instruments which can be used with high flow resistances; and which also permit study of the relation between flow and sheer stress with repeated tests of the same sample. They must in fact be able to deal with liquids not conforming to the Newtonian laws.

Such an instrument has been designed in the German Office of Weights and Measures, Weida, in Thuringia, and is described by H. Willenberg and W. Fritz (*Angew. Chem., B*, 1948, *20*, 134-9). An earlier instrument which was also designed to overcome existing difficulties in the usual methods was the subject of a dissertation by Hennenhofer (Dresden, 1945). This was a capillary viscometer, driven by compressed air, and operated in a cold chamber.

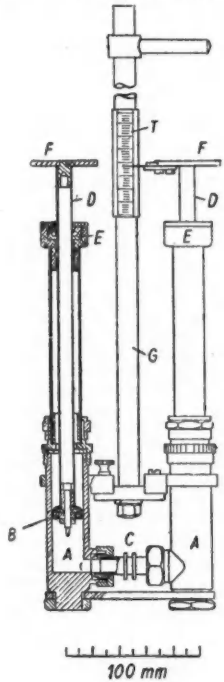


Fig. 1

The new device is based on simple principles, and consists essentially of two cylinders A in Fig. 1 of 25 mm. inside diameter connected by a capillary C. The

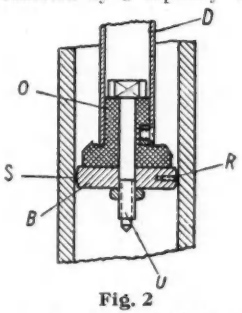


Fig. 2

liquid to be tested is forced from the first cylinder by a loaded piston into the second (first stroke) through the capillary, and by movement of a piston in the cylinder back again into the first (second stroke). These movements can be repeated.

After moving piston B out of the way, the liquid is poured until cylinder A is half-full. By means of piston B the material is forced to and fro through capillary C.

The other parts of Fig. 1 are probably self-evident: FF are flat discs to carry the load applied, G an upright support, and T a mm. scale. Piston B is shown in greater detail in Fig. 2. The left-hand side of Fig. 1 is of course in section, while the corresponding right-hand side shows an external view.

The instrument is immersed in the alcohol bath of a thermostat cooled by evaporation of liquid air, and the whole layout is shown in Fig. 3, in which K is insulated cover, L is evaporator, P the applied load, and Q a Dewar vessel.

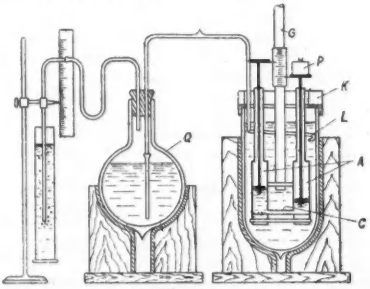


Fig. 3

Temperature is kept constant by a controlled air supply through pressure adjustment in Vessel Q, which serves as a container for liquid air, and is provided with a siphon. Where heat conservation is necessary tubing, etc., may be of hard paperboard or jacketed.

In moving the test material (oil or fat) by means of the loaded piston, the whole of the driving force is not applied in the capillary as frictional energy to the mass: a small part (a few per cent) is used up in the spaces between pistons and cylinder walls. In order to prevent entry of air to the test material, during the upward movement of the piston, a small additional load may be added to both pistons, so that, even with upward piston movement, a little of the oil or fat is always forced between piston and cylinder wall. The amount of oil so used is very small and does not affect the test results in any way.

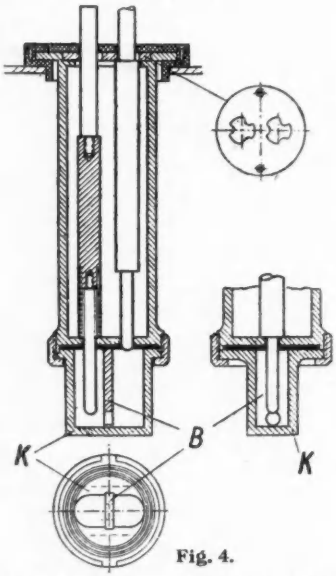


Fig. 4.

The apparatus was first tested with normal Newton liquids and the various factors evaluated, using the following expressions:

$$\eta = C\frac{P}{v}\ (1);\quad v = \frac{h}{t}\left(\frac{cm}{s}\right)\ (2)$$

$$v = \left(\frac{C}{\eta}\right)P\ (3)$$

in which viscosity is η, in poises, v is movement of piston, P is kp or kilopond (1 kg-force), h is piston track in cm., and C a constant determined by eight tests between temperatures 10° and 25°C., t = time, and s = sec.

C was determined for normal oils at the temperature range stated, in which viscosity ranged from 65 to 6310 poises. If C is a constant then equation (3) must be valid for all values of η and in accordance with (1).

For the new model instrument, with three capillaries of varying diameters the following values for C were determined: (1) 3.3 mm. 2.68; (2) 6 mm. 23.2; and (3) 100 mm. 128. C was also evaluated from apparatus dimensions in accordance with the Hagen-Poiseuille law, whereby equation (1) was confirmed.

The limits for which this constant is valid were determined in connection with the following factors and experimental conditions: length of piston stroke, heat of friction, load limits, viscosity range of instrument (10^3-10^6 poises), temperature range, loss of liquid in cylinders or elsewhere, thermal inertia. Experimental error is from ±1-2 per cent.

Tests were made with non-Newtonian or "structure-viscous" material, results of which are shown in a series of curves, showing the effect of load variation and test intervals, of temporary load reduction and increase, of small and large rest pauses at constant load, of reduced mechanical stress—by reducing the number of tests per time unit, continuous measurement with reduced stress (or load P). Temperatures in this series of experiments were −21-24°C., and load was in most cases 2 kp except where otherwise stated.

In the curves, variation in apparent viscosity $\eta = C\ (P/v)$ is shown as log. mean ordinates).

In Fig. 4 is shown a further development of the method and apparatus for materials of still greater viscosity; if flow resistance is further reduced, the driving pressure increased, and measurement scale more finely graded. Instead of the two cylinders, an elongated metal container K with screw top and base is used. This is completely filled with the test material.

Instead of the capillary as flow resistance a reversible baffle or diaphragm B is included, of which the opening can, if required, be made very large.

In steady operation of the instrument a pressure of several atmospheres may be applied with suitable load, with or without lever transmission—as compared with about 1 atmosphere shown in Fig. 1.

By suitable adjustment of flow resistance by baffle B viscosities up to 10^8 poises may be measured, or even up to 10^{10} by using microscopic readings.

THE TRAINING OF A CHEMIST

Increasing Complexity of Academic and Industrial Needs

by PROF. T. S. WHEELER, D.Sc., Ph.D., F.R.I.C.

PROF. T. S. WHEELER, who was recently re-elected president of the Irish Chemical Association, delivered his presidential address, on October 20, before a meeting of the association held in the Department of Chemistry, Trinity College, Dublin. His subject was "The Training of a Chemist." Before his address, Prof. Wheeler reminded his hearers that in the near future it was planned to transform the association into the Irish Institute of Chemistry.

In his address, Prof. Wheeler said he regarded the subject as of fundamental importance, because a body like their association must have always in mind the future of the profession and strive for a continuous improvement in the training of chemists. Before considering in detail the form and scope of this training, Prof. Wheeler said he thought it well to examine one or two aspects which added to the complexity of the problem.

In the first place there was the frightening continuous increase in the scope of their science. As he thought back 30 years to his student days, when the atom as far as the chemist was concerned had no internal structure, physical chemistry had a strictly limited content requiring little mathematics, and stereo chemistry was still simple, he could not but feel sorry for the modern student with so much additional matter to assimilate.

"Apart from the difficulty of subject matter," said Prof. Wheeler, "we teachers confront the fact that chemistry is extensively practised both on the pure and applied sides. In this connection we are between the natural sciences—botany for example—of which the application is not yet highly developed, and medicine. I say this with no intention of criticism, where we people on the side-lines sometimes think the practice swamps the science."

The Three Stages

The training of a chemist, continued the professor, could obviously be divided into three stages—school, undergraduate, and post-graduate. When he was at school there was a regrettable tendency to specialisation; one had to decide for or against mathematics and science or languages at 12 or 14. Opinion had now rightly swung the other way, and emphasis was laid on the necessity for a sound general education at school with no great emphasis on the special subject to be studied at the university. Thus, in the report of the Chemistry Education Advisory Board of the Royal Institute of Chemistry, emphasis was laid on the necessity for students of chemistry to receive a wide basis of general culture on which to build their intellectual life.

"It is considered that at least one-third of the school time should be allotted to the study of languages, history and other subjects of general interest," said Prof. Wheeler. "I think we should all like the future chemist on entering the university to be able to read French and German, have some facility in mathematics, and a general acquaintance with science and the scientific method. Above all, the student should be able to express himself clearly and grammatically. In America, Britain and Eire there seems to be general agreement that the more the chemist knows the less he can explain.

English Neglected

"My own experience with students—I may, of course, have been unlucky—is that in general they appear to have no training in the simple rules which lie at the base of English style. Further, students do not seem to be taught the necessity for revising and polishing what they have written."

One of the principal tasks of the university teacher of chemistry was how to isolate from the immense mass of material available what should be put to the student in his undergraduate course. It was now generally accepted that it was impossible adequately to train a student to the standard of an honours degree in less than four years. How best to do this and to supply also the necessary knowledge of ancillary subjects, such as physics and mathematics, was a question to which he could supply no certain answer, said the Professor. He thought they all agreed that there must be increasing specialisation as the course progressed and that the final year must be devoted solely to chemistry.

At present in University College, Dublin, a student took in the first year four, and in the second and third year three, subjects. There were many other possibilities open to discussion; in the third year, for example, a student might restrict himself to two subjects, chemistry as a major and physics, mathematics or botany as a minor subject.

Both types had their adherents. Those who feared over-specialisation preferred

the first; others who wished to bring a student as far as possible at the university suggested the second. He had seen both tried and was left with an open mind; the average student was as adaptable as the average baby and triumphantly survived a variety of intellectual diets.

Taking the three subjects for two years as a basis for discussion, Prof. Wheeler said on this system a student who intended to proceed to an honours degree in chemistry took chemistry, physics, mathematics and botany, or mathematical physics; in his second and third years he took three subjects—botany, chemistry and physics or chemistry, mathematics and physics. At the end of the third year the student sat a general degree examination in three subjects, and if he passed this examination and did well in chemistry he was admitted to the honours school.

The General Course

Dealing with the content of the general course in chemistry, the professor said in the first year it was usual to give a general survey of inorganic and general chemistry. This was, he thought, necessary so that students might obtain an idea of the scope of the subject, but it led to a certain amount of repetition in the second year.

Further, the professor's experience had been that the average student found the present method of presenting chemical philosophy difficult to follow. He learned a number of elaborately worded laws of which he only vaguely understood the implications. When to this was added the complication of Avogadro's hypothesis, he floundered, or at least he (the professor) did, for it was six months before he glimpsed what it was all about. He hoped, therefore, as an experiment to introduce the student to the atomic theory and then show how the facts fit, rather than present the facts and deduce the theory from them.

As regards practical work, the professor said he thought the time had come for qualitative analysis in the first year to be carried out by micromethods. In the second and third years, the time of the student was equally divided among his three subjects, which meant that in chemistry he would have four lectures and two afternoons' practical work per week. In the second year these lectures might be divided equally between physical and organic chemistry, and in the third year between inorganic and organic chemistry. The study of physical chemistry before inorganic chemistry might seem odd but it made certain that a student before he began the systematic study of inorganic chemistry had the necessary knowledge of atomic structure.

It was said, of course, not feasible for the student in the time available to learn enough chemistry to permit his being regarded as a professional chemist, went on Prof. Wheeler. He was equally entitled to be considered as a professional mathematician, a physicist or botanist, according to the other subjects he took for a degree. The primary object of the three-years' course was to impart a general knowledge of science which would be of use to a teacher or would serve as a foundation for specialised knowledge.

His experience with the type of general course which he outlined was that the students who specialised in chemistry received generally a knowledge of their subsidiary subjects sufficient to enable them to deal with a fourth year in chemistry. Chemistry itself was the chief difficulty. Two lectures a week for two years were sufficient for organic chemistry; the students received a course covering the general aliphatic and aromatic chemistry, together with lectures on the structure of some of the more important classes of compounds—terpenes and carbohydrates would serve as an example. In organic chemistry, too, when this was presented and the way opened to a discussion of the periodic table, it was possible to give an adequate survey of the subject.

Physical chemistry was, however, troublesome, said Prof. Wheeler. It was difficult in two lectures a week to give a sound course in what was now probably the most fundamental portion of the science of chemistry. As a result, some of the lecture time in the fourth year might have to be devoted to work less advanced than would normally fall to be done in the final year of an honours degree. That was why he had some sympathy with those who advocated in place of three, two subjects only, a major and a minor, in the third year.

Fourth Year

Considering the specialised work for the fourth year, the professor said there were two schools of thought. One held that a student should spend a portion of this year working on a research problem; others felt that it was better that his practical work should include an introduction to a variety of modern techniques—chromatography, high vacuum, distillation, absorptiometer working, and so on. At the moment he followed the second school mainly because students did research in their M.Sc. year.

It was usual, went on the professor, to divide the fourth year lectures into short courses on various themes of interest in modern chemistry. It was important, he felt, that at this stage students should receive instruction in quantum chemistry and on the structures of animal products, which

represented a main interest of organic chemists. A study of the chemistry of the sterols introduced the student to many interesting phases of stereochemistry and to a variety of complicated reactions.

In planning an honours course it had to be remembered that what was new at present might be in 20 years' time part of the stock-in-trade of the average chemist. When he was at college, isotopes were a novelty; (all chemists must now be familiar with the notion and the underlying theory). Similarly, 20 years after Schroedinger's classical work on quantum mechanics, they were only now learning how to teach it to chemists using simple mathematical methods; in 10 years it might be a part of all chemistry courses, and in 20 years there would be few chemists without some understanding of the subject. Advanced students must, therefore, receive lectures on what appeared to be subjects of little importance to present-day technical chemists.

They had now the fully trained chemist ready to begin his career, said the professor. There remained, however, the M.Sc. degree. A practical reason for taking that was that a man with an honours B.Sc. might be considered by an employer inferior to one with a pass degree holding the M.Sc. Further, a training in research methods was always valuable. On that account, an honours student might well decide to stay on for the M.Sc. and even the Ph.D. degrees. This meant that fully to qualify himself a student would have to spend seven or more years at college—a long time, but it took as long to train a medical doctor, and there was no reason why the training of a chemist could be performed more quickly.

Honours Students

What, then, did they hope to have achieved when they finished with their honours student? asked the professor. They might, he thought, expect them to have a good manipulative technique and a general knowledge of chemistry in all its branches. They should know where to look for such special knowledge as they needed in connection with the problems they encountered. They should also have learned to think scientifically, to form their opinions on the facts, and devise these opinions if additional facts made it necessary. Further they (the honours students) should be tolerant of the opinions of others and always remember that they were as likely to be wrong as those with whom they differed. They should have come to realise that they were members of an ancient profession to which belonged and had belonged many great men and that they should always bear themselves accordingly.

So far, said the professor, he had been dealing with the training of a chemist as ordinarily understood. This training, however, was purely academic, so that for years there had been complaints from industrialists that an academically trained man without much other experience was of little use to them. It was, they said, as if a doctor went into practice without hospital experience of any kind. There was much discussion of this sort after the first world war during which there had been a sudden and urgent demand for factory chemists, and when academically-trained men were, it was stated, in many instances found wanting.

Technical Training

The question how far a university should attempt technical training bristled with difficulties. The professor thought, however, that it was perhaps unfair to expect a small employer who had one or two chemists to teach them their industrial technique at his own expense. Further, his general experience during the last three years had been that Ph.D.'s and men with first class honours seemed to settle down less readily in industry than second honours and pass men.

Generally, and he regretted to have to say it, in industrial organisations in which he had had experience, the engineers seemed to fit in better and to be of more immediate value than the chemists

In recent years, many universities had made provision for teaching applied chemistry, and some years before the war, his predecessor, the late Prof. T. J. Nolan, and Prof. M. J. Hogan, Professor of Mechanical Engineering in the College, planned a course in chemical technology to be taught in University College, Dublin. The war prevented the starting of the course. It had now, however, become possible to provide facilities for teaching it, and this session would see it in operation for the first time. As a tribute to the memory of Prof. Nolan, whose efforts made this course possible, it was proposed to call their new technical laboratory the Nolan laboratory.

They regarded it as essential that technical chemistry should not be studied until the student had had a good grounding in the fundamentals of the science, went on the professor. Accordingly, those students who passed the General Science examination, and who were not attracted to further academic studies, could apply for admission to the new course. The curriculum provided for a training in the fundamentals of engineering drawing and lectures on unit operations. There would be lectures also on fuel and its utilisation and on such elementary engineering as would be useful to a chemist who was expected to run all departments of a small factory.

Electron Microscopic Studies

Aid to I.C.I. Paint Research

IN its continuous research for improved paints, the Paints Division of I.C.I., Ltd., has installed an electron microscope capable of a total magnification as high as 50,000 times—that is 25 times greater than the ordinary microscope. This will be of considerable help towards solving some of the problems that confront the paint manufacturer in meeting the complex requirements of his customers. One of these problems is to provide a perfectly opaque surface with lasting gloss. At first sight this may not seem very difficult, but some idea of the extent of the problem can be gauged from the magnified photograph of zinc oxide pigment reproduced which reveals the strangely shaped particles, their gritty appearance, and sharp edges. A cluster of such particles may cause in a finish minute irregularities which break up the reflecting surface, and cause poor gloss.

In addition to their effect upon the smoothness of a painted surface, the shapes and sizes of pigment particles, and the efficiency with which they are incorporated into the paint, also have a marked influence on uniformity of colour and ease of brushing.

Many of the commonly used pigments contain particles so small that they cannot be detected under the ordinary microscope, and knowledge of their shapes was limited. Under the electron microscope, a trial finished paint surface may be examined, and the first signs of surface faults detected long before they become apparent to the naked eye.

It is interesting to note how close is the parallel, in different media, between the electron microscope and the ordinary optical microscope. The main differences are that the specimen is " illuminated " by a beam of swiftly moving electrons instead of light, and that glass lenses are replaced by specially shaped magnetic fields. The electrons serve a purpose similar to light, and the magnetic fields—or magnetic electron lenses, as they are called—act on the moving electrons in much the same way as glass lenses act on light.

Mr. J. Davidson Pratt

THE CHEMICAL AGE hastens to tender its apologies to Mr. J. Davidson Pratt, director of the Association of British Chemical Manufacturers, and to Sir Frederick Bain for the inadvertent substitution last week of the latter's name in the caption of the picture showing Mr. Davidson Pratt, accompanied by the President of the Board of Trade (Mr. Harold Wilson), at the annual dinner of the ABCM (THE CHEMICAL AGE, October 23, page 550).

More Barium Chloride

New Plant Will Relieve Acute Shortage

THE prolonged shortage of home produced barium chloride which has been a source of embarrassment to chemical, paint and some other industries is likely soon to be relieved. This is the effect of a statement issued this week by Laporte Chemicals, Ltd., of Luton. The company, which has been intimately concerned for a number of years with the production of a variety of other barium compounds, states that the erection of a plant for the manufacture of barium chloride at the Barnsley works of its subsidiary, John Nicholson & Sons, Ltd., is well advanced and production is expected to begin at the end of November.

It is stated that this plant will be large enough to meet the home trade requirements and it is hoped to have a supply available for the export market.

In the first instance, the product will be made in the crystal form, but subsequently an anhydrous quality will be produced.

The scarcity of barium chloride, which has enforced greatly increased dependence on Continental supplies at inflated prices, dates approximately from the closing down at the beginning of this year of this department of the Athole G. Allen Company for reasons which were fully explained at the time by the chairman of the company (THE CHEMICAL AGE, February 14, 1948). There is ample evidence that mineral barytes in various parts of the country are sufficient to supply all foreseeable needs.

ALLOCATION OF ISOTOPES

A COMMITTEE to decide priorities in allocating radioactive and stable isotopes has been set up under the chairmanship of Sir John D. Cockroft, director of the atomic energy research establishment at Harwell, Berkshire. The committee include representatives of the Medical Research Council, the Agricultural Research Council and the Department of Scientific and Industrial Research, representing universities and industrial interests.

Announcing this on October 24, the Ministry stated that while isotopes are scarce, the committee will decide questions of allocation to research workers in science and industry in accordance with the urgency of the investigation and the facilities available for its conduct. " Gleep," the low-energy pile at Harwell, is already providing limited quantities of radioactive isotopes and facilities for experimental workers, and arrangements have been made to buy American and Canadian radioactive isotopes to supplement these supplies until the large pile at Harwell is operating at full power.

Vermiculite in South Africa

Widening Scope of Domestic Chemistry and Industry

SPECIFICATIONS are being prepared for vermiculite and its products for submission to the South African Bureau of Standards in order to stabilise the quality throughout the Union. The establishment of a standard will overcome the difficulties of a number of manufacturers of vermiculite products in obtaining continuous supplies of vermiculite of specific quality. As an insulating material, the specific gravity is of great importance.

It is almost impossible to obtain a large quantity of exfoliated vermiculite in which all the bags contain the same material. Variations in density up to 25 per cent are common. This is due to uneven exfoliation through the raw material being fed into the furnaces without proper grading. Thus, when the heat and speed of the exfoliator are adjusted to deal with larger flakes the smaller ones burn and crumble to powder.

* * *

During the year to March 31, 1948, Gypsum Industries, Ltd., showed a profit of £15,988, as compared with £17,001 for the previous year. The dividend is maintained at four per cent. Capital expenditure on the Cape Town factory amounted to £105,037. It began operations only in July, 1948, so that the additional share capital of the company will now become productive. Supplies of gypsum from South African quarries have been satisfactory, and the position in regard to other materials has eased considerably.

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Fertiliser factories in South Africa are operating at full capacity but deliveries of their products are being delayed by shortages of rail transport. The Union's allocation of nitrogen fertilisers will, as in past seasons, again fall short of the farming industry's full needs, but increased consignments of superphosphates are being received from Europe and it is expected that these will go far towards meeting the existing demand. Supplies of potash are reported to be sufficient to meet this season's demand but future importations give rise to feelings of uncertainty due to the disturbances in Palestine.

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There has been a decrease in salt production in the Cape Peninsula because of excessive rains, according to an official of a firm owning salt pans in the Malmesbury district. During the past season, he said, salt production had dropped by one-third. Normally 40,000 bags of salt—the equivalent of 4,000 tons—were obtained in a season. An improvement is expected next year. Prieska, which provides much of the local salt needs, also suffered from heavy rains earlier in the year, about 70,000 bags being lost. The pans of one firm, which produces 5000 tons a year, were "drowned" by the rains and no salt was produced. Two other pans normally yielding 8000 tons and 1200 tons a year, respectively, which were also affected by the rains, are expected to go into production again in October after having been closed for several months. Pans in the Britstown district are also expected to resume work in October.

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Experiments conducted recently on Government experimental stations with wheat and maize have shown that by using 2,4-D, yields can be increased by as much as 25 per cent. Another indication of the power of the preparation is that it kills off the water hyacinth. Hitherto the eradication of this weed has been a gigantic task. All previous weed killers have contained poison and could not be used in water. Now, 2,4-D is used—a 0.1 per cent solution finishing off the hyacinths.

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African Bitumen Emulsions (Pty.), Ltd., of Durban, and Road Emulsions (Pty.), of Johannesburg, have been amalgamated to form African Bitumen Emulsions (Pty.), Ltd., with the head office at 96 Point Road, Durban, and plants in Durban and Johannesburg.

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A Rhodesian company, known as Asbestone, Ltd., Bulawayo, is to make asbestos cement and other products for roofing, piping, and pre-fabricated houses. The company has a capital of £100,000. The factory was opened recently by the Rhodesian Minister of Commerce and Industry. The value of this company to the reduction of housing costs is being stressed.

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Rust preventatives of high quality have recently been developed by a firm of wool scourers in Durban. Lanolin is used as a base, this raw material being recovered as a by-product in wool scouring.

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The Union obtains the bulk of its requirements of soda ash from Lake Magadi in Kenya. Consumption of soda ash in the Union has risen from approximately 7000 tons per annum in 1938 to 35,000 tons per annum in 1947, and as soda ash is scarce throughout the world the difficulty of obtaining adequate supplies for the Union's needs is evident. Local users have been receiving about 70 per cent of their needs.

Rubber Seed Oil

More Encouraging Reports from Ceylon

EXPERIMENTS conducted by Dr. A. Sundaralingam, the Ceylon Government's rubber technologist, confirm the opinion expressed by the Rubber Commission recently that there is a useful harvest to be derived from the collection and sale of rubber seeds for oil extraction, states a report received from our Correspondent in Ceylon. The oil extracted from rubber seeds may form a substitute source of linseed oil.

In the past these seeds have been regarded as a waste product, and the commercial possibilities of their collection and marketing were, in fact, the subject of a not very encouraging report (THE CHEMICAL AGE, September 25).

The rise in the price of linseed oil in March, 1947, was partly responsible for the Rubber Commission's recommendation that rubber seed collection might well be encouraged on small holdings. The sale of seed, in their opinion, "would provide a welcome seasonal addition to the small holders' earnings, and it is hoped that the Government's rubber purchasing depots will assist by organising the marketing of the smallholders' crops."

Three tons of oil have already been extracted at the laboratory of the Government rubber technologist. A ton of this oil fetched about £150 in the market and, therefore, the extraction of oil on a large scale is regarded as a reasonable commercial proposition.

On a conservative estimate, the rubber seeds that fall each year in Ceylon contain between 10,000 and 12,000 tons of oil worth between Rs.10-12 million. The Government is at present paying 5 cents per lb. for rubber seed, and in the near future when the necessary plant for the extraction of oil on a large scale is erected, there is the prospect of 3000 tons of oil being made available for export in the first few years of production.

CEYLON SALT PRODUCTION

THE salt production in Hambantota, Ceylon, is a record for recent years, and there is every prospect of the island's yield overlapping the one million cwt. level of production. According to Mr. E. B. Tisseverasinghe, the Salt Commissioner, this year's production has been sufficiently satisfactory to enable Ceylon to get all her requirements of salt from the local yield. The yield of salt this year is the first good one for about eight years; a yield of 600,000 cwt. annually is reckoned good.

Iranian Production Plan

Proposed New Chemical Factories

A REPORT on Iran, now published by the Export Promotion Department of the Board of Trade in its series "Overseas Economic Surveys," contains, in addition to the usual facts and figures on finance, foreign trade, agriculture, industry and transport, interesting particulars about the seven-year plan prepared by a mission of United States experts and submitted to the Iranian Government last year.

The mining section of the report states that coal production amounts to some 150,000 tons per annum, produced from small horizontal shaft mines operated on behalf of the State by the Industrial and Mining Bank. As regards other minerals, 1000 tons of copper, 600 tons of sulphur, 10,000 tons of red oxide and 500 tons of arsenic ore are mined annually, all in State-owned enterprises. Borax deposits are known to exist in four localities, one of these deposits being estimated to represent about 22,000 tons. Exploitation by private enterprise has been limited to home demands as the outbreak of war terminated negotiations for the export of borax to France.

A sodium carbonate plant, erected in Teheran during the war to meet Allied needs, has an annual output of about 1000 tons. A proposal has been made to establish an iron smelting works at Kerej to use locally mined ores.

The only cement factory in the country is situated at Teheran and produced about 35,000 tons during 1946, at a cost of approximately 170s. per ton. Machinery, which is mostly of German and Danish origin, deteriorated greatly during the war, but recent repairs to a section of the drum mixing plant should make it possible to increase production. This factory is to be enlarged.

New Oil Company

For the development of the chemical industry it is proposed to erect the following factories: a sulphuric acid unit with an output of 45,000 tons per annum; a sodium carbonate and bicarbonate plant with an output of 14,000 tons; ammonia and ammonia fertiliser plants with an output of 15,000 tons, and tanning factories with an output of 10,000 tons per annum.

To exploit Iran's very large resources of oil, it is proposed to form an Iranian Oil Company to prospect in all areas not yet covered by existing concessions. The directors of this enterprise are to be exclusively Iranians, but technical directors and specialists may be engaged from abroad.

The report contains a special chapter on the work of the Anglo-Iranian Oil Co., Ltd.

PERSONAL

MR. J. J. MURRAY, of Imperial Chemical Industries, Ltd., was elected senior vice-president at the annual meeting of the Cleveland Scientific and Technical Institution.

The Minister of Fuel and Power has appointed MR. A. H. A. WYNN to be director of the Safety in Mines research and testing stations at Sheffield and Buxton.

MR. DAVID FLATHER, of Maltby, near Doncaster, a director of W. T. Flather, Ltd., the Sheffield manufacturers of alloys and BD Steel bars, who was Master Cutler in 1926, left £68,077 (£59,646 net).

MR. J. KENNETH WEIR, C.B.E., managing director of G. & J. Weir (1947), Ltd., and a director of the National Bank of Scotland, Ltd., has been appointed a director of the Dunlop Rubber Co., Ltd.

MR. F. H. STEVENS, chairman of the Sheppey Glue & Chemical Works, Ltd., Horley, and Mrs. Stevens, celebrated their golden wedding on October 18. Mr. Stevens, who has completed over 60 years with the firm, has been chairman for the past 19 years.

Employers' representatives on the Council of the Anglo-American Council of Productivity are: (Federation of British Industries) SIR FREDERICK BAIN, MR. A. R. BAINES, SIR PETER BENNETT, SIR MAURICE DENNY; (British Employers' Confederation) SIR GREVILLE MAGINESS, MR. C. B. CLEGG, and SIR JOHN FORBES WATSON.

De La Rue Insulation, Ltd., announces that MR. S. P. JORDAN, the architect who has been in charge of the company's design section, has resigned to take up private practice, but will continue to serve as the company's design consultant in connection with its Formica and other laminated plastics.

SIR JOHN DUNCANSON has resigned from the commercial and technical directorship of the British Iron and Steel Federation. Sir John joined the Iron and Steel Control in 1939 at the beginning of World War II. He succeeded to the controllership in 1942, where he remained until he took up his position with the Federation. MR. EDWARD W. SENIOR, Master Cutler of Sheffield for 1948, succeeds Sir John as commercial director of the federation.

MR. LOUIS W. CABOT will arrive at Liverpool with a staff of American engineers in mid-November to initiate the establishment on Merseyside of the first U.S. factory scheduled for Britain under the Marshall Plan. Engineering and construction of the plant for the manufacture of carbon black will be by British concerns under the direction and advice of a staff of technicians from the American company.

The honorary degree of Doctor of Technical Sciences was conferred on three noted powder metallurgists at the First International Powder Metallurgy Conference in Graz. The awards were made to DR. P. SCHWARZKOPF (U.S.A.), formerly Metallwerk Plansee, Reutte, Tyrol, now editor of the Powder Metallurgy Bulletin; PROF. J. A. HEDVALL, Swedish pioneer on powder metallurgy, who lectured on "Surface Activity and Powder Metallurgy" at the congress, and DR. W. D. JONES (England) author of the first well-known text-book on powder metallurgy.

MR. J. C. MANN, who has retired from the board of Midland Tar Distillers, Ltd., began his career in the tar industry with The Gas Light & Coke Company in 1883, and after serving with Major & Company, Ltd., of Hull, and Robinson Brothers, Ltd., of West Bromwich, he became general works manager of Midland Tar Distillers, Ltd., in 1921, and held this position till 1938. He became a director in 1937. He is a familiar and popular figure in the industry, particularly in the technical field, and an active supporter of various scientific institutions, notably of the Society of Chemical Industry, which he joined in 1891.

PROF. M. L. E. OLIPHANT, Professor of Physics at Birmingham University since 1937, has been appointed director of post-graduate research in the school of physical sciences at the National University of Australia. Prof. Oliphant was born in Adelaide in 1901 and studied at the University of Adelaide and Trinity College, Cambridge. He became Messel Research Fellow of the Royal Society in 1931; Fellow and lecturer, St. John's College, 1934, and the following year was appointed assistant director of research, Cavendish Laboratory, Cambridge. The professor will take up his post when the university is established as a working body, possibly in 1951. Meanwhile, he will continue to advise on the establishment of a research school of physical sciences in Canberra.

Obituary

The death has occurred at Balmore, Dumbartonshire, of MR. WILLIAM SMITH PAIREMAN (62), chairman and managing director of the Lambhill Iron Works, Ltd., Glasgow, of which he was one of the founders, and chairman of the Scottish Structural Steelwork Association.

The death has occurred at Gourock, Renfrewshire, of MR. ALEXANDER (ALASTAIR) STEWART, a director of Graig & Rose, Ltd., paint manufacturers, of Edinburgh and Glasgow. He was in charge of the firm's Glasgow branch and had served the company for 51 years, six years longer than the period served by his father, the late Mr. Donald Stewart.

DR. J. L. POLAK, who died in London last week, aged 64, was for some 13 years a director of Lever Brothers & Unilever, Ltd., and had been an advisory director since he retired at the end of 1946. He joined the Van den Bergh business in 1922, and enjoyed repute and esteem in Anglo-Dutch legal and business circles.

The death has taken place of SIR WILLIAM PETER RYLANDS, at Massey Hall, Thelwall, near Warrington, at the age of 80. He relinquished a legal career to become managing director of the family firm of Rylands Bros., Ltd., in 1898, and gradually extended the scope of the concern by adding heavy steel and coal to its interests. He held many important industrial appointments

MR. CHARLES ALEXANDER HILL, whose death occurred last Saturday in London at the age of 74, had been chairman and managing director of British Drug Houses, Ltd., from its inception in 1909 until his retirement in 1943. He obtained the Pharmaceutical Society's " major " certificate in 1896, the Fellowship of the Institute of Chemistry in 1899, and the B.Sc.(London) in 1904. His father and grandfather were both pharmaceutical chemists. Early in his career Mr. C. A. Hill foresaw the advantages of forming a group of manufacturing chemists on a scale far beyond the resources of any firm then in existence, and succeeded in uniting five century-old concerns as British Drug Houses. This enabled him and his associates to bring about big advances in the production of fine chemicals, first developing the manufacture of pure organic substances used in medicine and, then, introducing here the manufacture of complex organic substances for use in analysis and research, and so helping to displace German manufacturers from the leading position they formerly occupied. Mr. C. A. Hill filled many public offices on pharmaceutical, chemical, commercial and public bodies. He was Master of the Salters' Company, and was closely associated with the formation and development of the Salters' Institute of Industrial Chemistry.

The death of DR. SAMUEL E. SHEPPARD, in Rochester, U.S.A., recently, has deprived the world of one of the highest authorities on the chemistry of photography, writes a correspondent. Born in Kent in 1882, Dr. Sheppard graduated from University College, London, with first class honours in chemistry. His work in photography, which dated from his university days in the early 1900's and continued until his retirement from Eastman Kodak on January 1 this year, contributed much to present-day photographic knowledge. An early discovery by Dr. Sheppard and his co-workers was the effect of sulphur compounds in gelatin on the sensitising action of the gelatin on silver bromide. New means were then devised of standardising such emulsions and producing film of more nearly uniform quality. Another of Dr. Sheppard's achievements was the discovery of several compounds which increased the sensitivity of film in various parts of the spectrum, thus paving the way for the high-speed and panchromatic films of to-day.

Fatal Fire and Explosion

Police and experts from the North-West Forensic Laboratory, Preston, spent several hours on October 23 at Farnworth investigating the cause of a mysterious fire and explosion which killed two men employed at the Britannia Chemical Works of W. C. Smithies & Company, tar and oil distillers. One theory is that the clothing of one of the men became ignited from a fire beneath a still. An explosion followed as his blazing clothing ignited vapour in some cooling tanks and then in turn his mate's clothing was ignited by the flashback. Four 500 gallon boilers of tar and oil were involved in the fire, but extensive damage was prevented by Farnworth fire brigade, who called in Bolton and Radcliffe.

Diversion of Exports. — The Board of Trade states that it is occasionally asked by exporting firms whether goods may be delivered from the export quota to residents of the United Kingdom against payment from accounts in other parts of the sterling area. The board emphasises that such transactions are directly contrary to the national interest. They should not appear as exports in the returns made by industry to the Board of Trade, nor should they be recorded against export targets.

Home News Items

Silica Refractory Bricks.—The Treasury has made the Import Duties (Exemptions) (No. 2) Order, 1948, which exempts from general ad valorem duty silica refractory bricks. It came into operation on October 16.

Lithopone from Germany.—Leonard Baines & Co., Liverpool, has been appointed sole agent for the Sachtleben Company, German manufacturers of lithopone, and the Board of Trade has granted import licences against firm orders.

World Engineering Conference.—Consultative status has been granted by UNESCO to the British section of the World Engineering Conference, which thus becomes recognised as the means of international contact between engineers, and is entitled to work with and send representatives to UNESCO.

Need for Veterinary Research.—The principal livestock diseases are the cause of the nation losing each year 6 m. rations of meat, 200 m. gallons of milk and 1500 m. eggs. These figures were revealed when the Duke of Norfolk attended a luncheon in London to appeal for funds to support the work of the Animal Health Trust.

Paper Mill to Close?—Because of the declining demand for esparto papers overseas and difficulties in the home usage of paper, the Ellangowan paper mills, Milngavie, Glasgow, may be forced to close. Some 300 workers have been advised that their employment will finish at the end of this month. A company meeting will be held shortly to decide the future of the mill.

Lampblown Scientific Glassware. — The growing tendency of Government departments to regard the British Lampblown Scientific Glassware Manufacturers' Association as the channel of contact between the Government and the industry was referred to by the president, Mr. H. J. Poulten, at the association's annual dinner in London recently. Mr. A. W. Rundle, chairman of the British Laboratory Ware Association, stressed the need for co-operation.

Agricultural Research.—The vital importance of research to farmers and agricultural students was the main theme in the address of Mr. Arthur Woodburn, Secretary of State for Scotland, on Founder's Day when he opened the newly constructed laboratories at the Rowett Research Institute, near Aberdeen. The laboratories, he revealed, formed only part of a ten year scheme covering the whole field of agricultural research with full Government backing.

£1 Million for Newsprint.—Britain has this week been authorised by the Economic Co-operation Administration in Washington to purchase $4 million (£1 million) worth of newsprint from Canada with Marshall aid funds.

Cotton Conference.—Nearly 1000 delegates from the cotton industry will attend the forthcoming conference at Harrogate organised by the Cotton Board. The President of the Board of Trade, Mr. Harold Wilson, and the Minister of Labour, Mr. George Isaacs, will be among the principal guests.

Directorate of Paint Materials.—The Board of Trade announces that the removal of the directorate from Grosvenor Gardens, London, S.W.1, to Horseferry House (Fourth Floor), Horseferry Road, London, S.W.1 (telephone VICtoria 6800). The address of the Paint Industry Materials Allocation Office remains unchanged.

Highest 1948 Coal Output.—The total British output of deep-mined coal last week was the highest this year, but was still below the weekly average of 4,336,000 tons required to reach the 1948 target of 200 million tons. Comparative figures are: Last week 4,274,700 tons (4,044,300 tons deep-mined, 230,400 tons open-cast), previous week 4,239,100 tons (3,992,300 tons deep-mined, 246,800 tons open-cast).

MoS Project at Blackpool.—It was disclosed on October 20, two days after a visit to Blackpool by plane of Ministry of Supply officials, that the recent plan for the reopening of Squires Gate factory as an atomic research station has been dropped. In its stead, the Ministry is said to be working on a plan, proposed only within the last few days, which would employ several thousands at Squires Gate. During the war Wellington bombers were built there, and at its peak the factory employed 8000.

River Pollution Fine.—An appeal against a conviction and a fine of £15 by the Pwllheli magistrates on a summons alleging pollution by liquid ammonia of the River Eroch was dismissed in the King's Bench Division on October 22. For the appellant, Mr. Basil W. Soane, it was stated that the chairman of the magistrates had been present at the meeting of the local Fishery Board at which the decision to prosecute was taken. Mr. Justice Goddard ruled that the magistrate was not disqualified from adjudicating in the particular circumstances. He quashed the orders which had been made against the appellant and one other for payment of costs.

Next Week's Events

MONDAY, NOVEMBER 1

Society of Chemical Industry (Yorkshire section) in conjunction with Leeds University Chemical Engineering Society, University, Leeds, 7 p.m. H. H. Goldthorpe, W. H. Hillier, C. Lumb, and A. S. C. Lawrence: "Problems Arising from the Disposal of Effluents Containing Synthetic Detergents." Discussion. SCI Food Group: Royal College of Science, Huxley Building, Exhibition Road, South Kensington, S.W.7, 2.15 p.m. and 5.15 p.m. Symposium on: "Aspects of Packaging with Particular Reference to the Food Industry."

The Chemical Society (Oxford) Alembic Club lecture, Physical Chemistry Laboratory, South Parks Road, 8.15 p.m. Dr. W. F. Short: "Some New Methods for the Preparation of Amidines."

Royal Institute of Chemistry (Birmingham University Chemical Society). University, Edgbaston, 4.30 p.m. D. L. F. Wiggins: "Recent Advances in the Chemistry of Simple Carbohydrates."

TUESDAY, NOVEMBER 2

The Chemical Society (Eire). University College, Dublin. Prof. H. J. Emeléus: "Production and Uses of Radioactive Tracers."

Electrodepositors' Technical Society. James Watt Memorial Institute, Great Charles Street, Birmingham. P. Berger: "Barrel Plating and Barrel Finishing."

Institute of Metals (South Wales local section). University College, Singleton Park, Swansea, 6.30 p.m. Ivor Jenkins: "Controlled Atmosphere in Non-Ferrous Metallurgy."

WEDNESDAY, NOVEMBER 3

British Association of Chemists, Gas Industry House, 1 Grosvenor Place, London, S.W.1. 7 p.m. N. J. Megson: "Recent Advances in Thermosetting Resins."

Royal Institute of Chemistry (Society of Chemical Industry), University, Edmund Street, Birmingham, 6.30 p.m. Dr. W. G. Overend: "A Chemical Approach to Cytology"; Dr. M. Webb: "The Chemistry of Bacterial Cell Division"; A. S. Johnson: "Estimation of Water in an Industrial Laboratory."

Manchester Federation of Scientific Societies. Institute of Welding, Reynolds Hall, College of Technology, Manchester, 7 p.m. Edwin Davis: "Brazing of Ferrous and Non-Ferrous Metals."

Manchester Metallurgical Society. Engineers' Club, Manchester, 6.30 p.m. N. P. Allen: "Recent Developments at the National Physical Laboratory."

Paper Makers' Association, Engineers' Club, Manchester, 7 p.m. G. G. Taylor: "Colour Measurement."

THURSDAY, NOVEMBER 4

The Chemical Society (Sheffield). Chemistry department of the University, 5.30 p.m. Prof. W. T. Astbury: "The Electron Microscope and some Recent Discoveries with it in the Field of Macromolecules."

Institute of Metals (Leeds Metallurgical Society), Chemistry Department, University, Leeds, 7 p.m. Dr. R. Genders: "Wartime Metallurgical Developments in Great Britain."

Textile Institute (Yorkshire section), Technical College, Keighley, 7 p.m. R. J. Steele: "The Mystery of Colour."

Royal Institute of Chemistry (Liverpool), 7 p.m. Dr. W. H. Grace: "Some Aspects of Forensic Science."

FRIDAY, NOVEMBER 5

Sir John Cass Technical Institute (Department of Chemistry), Jewry Street, Aldgate, E.C.3, 6 p.m. G. Speight: "Stainless and other Special Steels."

The Chemical Society (Newcastle and Durham). King's College, Newcastle-on-Tyne, 5 p.m. Reading of original papers.

Society of Dyers and Colourists (Midland section), Feld's Cafe, Westgate, Huddersfield, 7.30 p.m. Section dinner: Visit of the President.

SATURDAY, NOVEMBER 6

Institution of Chemical Engineers (N.W. branch). Joint meeting with Chemical Engineering Group (Manchester), College of Technology, Manchester, 3 p.m. J. Leyland: "The Cooling of Circulatory Water for Coolers and Condensers."

Atomic Scientists' Conference

The Atomic Scientists' Association is holding to-day (Saturday) its annual conference at the Beaver Hall, Garlick Hill, E.C.4. There will be two sessions, from 2.30 to 5 p.m., and from 7 p.m. to 9.30 p.m.

The first session is concerned with atomic energy and society, and speakers will include Prof. Blackett on atomic weapons, Sir George Thomson on international control, Prof. Mott on national policy, and Prof. Pryce on the constructive applications of atomic energy. In the evening, speakers will include Sir Henry Dale, Prof. Peierls and Prof. Oliphant on the position of the scientists with regard to atomic energy and related problems.

Overseas News Items

Carbon Black Furnace Lining.—The Lone Star Steel Company's blast furnaces at Dallas, Texas, have been fitted out with linings of carbon black, which is reported to improve efficiency. The plant's production of foundry iron is said already to have exceeded the rated capacity of 970 tons gross per day.

South Africa to End Fertiliser Control.—Control of superphosphate supplies in South Africa is expected to end next year when new factories come into production. Total output is then expected to reach about 500,000 tons a year, which should be sufficient to meet demands. Nitrogenous fertilisers, however, are likely to remain in short supply.

Belgian Dyestuffs.—The dyestuffs department of the Belgian Tertre group has recently been reorganised and it is reported that about one-half of its total output is exported, chiefly to the Balkans, Latin America, Scandinavia, India and China. It is believed that the group has captured a substantial share of the former German market in dyestuffs.

Swiss Chemical Society.—The 60th annual meeting of the Swiss Society for Analytical and Applied Chemistry was held recently at Sion, with the president, Dr. R. Viollier (Basle), in the chair. Over 100 members and nine foreign delegates attended. The two main papers were: "Analytical Methods in the Research with Inactive Isotopes," read by Prof. K. Clusius (Zurich), and "Toxicological Research on Mercury," read by Prof. E. Cherbulier (Geneva).

New U.S. Sugar Refining Process.—The cost of refining sugar may be greatly reduced by a new process discovered in the U.S.A., it is claimed in a report by Dr. Donald F. Othmer, head of the department of chemical engineering in the Polytechnic Institute of Brooklyn, New York, who states that the discovery represents one of the few major new methods for refining sugar since bone char and other char were developed 100 years ago.

Cinnamon Stocks in Ceylon.—More than 42 million lb. of cinnamon are reported to be lying idle in Ceylon, where stocks continue to pile up in the absence of buyers. Only 16,500 bales of cinnamon have been sold from Ceylon during the seven months January to July this year (one bale of cinnamon is equivalent to 100 lb.). Producers have appealed to the Government for freer trading facilities so that they can export to any country without having to apply for licences.

Bauxite from British Guiana.—Exports of bauxite *via* Demerara increased from some 619,500 tons in the first seven months of 1947 to approximately 1,088,800 tons for the same period this year.

Cement Production in Southern Rhodesia.—A new £600,000 plant capable of producing 100,000 tons of cement a year will start operating in Southern Rhodesia next month. Maximum output is not expected to be achieved before April or May, 1949.

Dutch Iron and Steel Production.—The Koninklijke Nederlands Hoogovens en Staal-Fabrieken N.V., leading iron and steel works of the Netherlands, in its report for the year 1947-1948, revealed considerably increased output mainly due to works reconstruction.

New U.S. Credit for Brazilian Iron.—Stated to be the largest Brazilian mining and iron ore company, the Cia. Vale do Rio Doce, has recently been granted a further credit from the Washington Export-Import Bank, aggregating about $7,500,000 at 3½ per cent. The money is to be used for improvements to the railways linking the mines with the port of Victoria as well as for the purchase of mining equipment.

Italian Industries for S. Africa?—The African-Italian Financial and Industrial Corporation, a joint South African and Italian venture, with a capital of £1 m., is stated to be planning the transfer of existing Italian enterprises to South Africa. For example, a large alcohol distillery is to be erected near Natal, and plans are in hand for an iron and steel plant and a ceramic factory.

Scandinavian Chemical Co-operation.—Three Scandinavian chemical companies, the Danish Sadolin & Holmblad A/S, Swedish Upsala Ekeby A/B, and Norwegian Norsk Spraengstofindustri A/S, have formed a joint company to erect a phthalic anhydride plant near Copenhagen. The new plant, which it is anticipated will be completed by 1950, may be sufficient to supply all the Scandinavian countries.

Exploitation of Jura Oil Shales.—Bituminous oil shale deposits known to exist in the Swiss Jura, more particularly between Courtemantruy and Asuel where the average oil content is estimated to be 4½ per cent, are to be utilised for the manufacture of special building material. The advice and co-operation of Sweden is being sought, as a method has already been developed of making satisfactory building materials from Swedish oil shale residues.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ADVANCED ANODISING AND PLATING CO., LTD., London, N. (M., 30/10/48.) September 21, debenture to Barclays Bank Ltd., securing all moneys due or to become due to the Bank; general charge.

BRITISH PLASTOIDS CO., LTD., Barrow-on-Soar. (M., 30/10/48.) September 24, £1000 further charge, to C. R. B. Eddowes, Derby; charged on Southfield, Barrow-on-Soar. *£1200. November 15, 1945.

LAFARGE ALUMINOUS CEMENT CO., LTD., London, W. (M., 30/10/48.) September 30, £25,000 4 per cent first debenture stock, part of amount already registered. *£35,000. October 9, 1947.

PEEL LABORATORIES, LTD., London, N. (M., 30/10/48.) September 22, £800 debentures, part of a series already registered. *£500. January 12, 1948.

SANT STURGESS, LTD., London, N.W. (M., 30/10/48.) September 22, £50,000 charge to Universal Estates Ltd.; charged on 1 Gorst Road and 7 Sunbeam Road, Chase Estate, N.W.10. *£27,500. March 23, 1948.

SOLARTRON LABORATORY INSTRUMENTS, LTD., Kingston-on-Thames. (M., 30/10/48.) September 20, series of £1000 debentures, present issue £730; general charge.

WESTERN OXIDE & PAINT CO., LTD., Plymouth. (M., 30/10/48.) September 17, mortgage to Halifax Building Society securing £3450 and further advances; charged on Commercial Yard, Sutton Road, Plymouth.

Satisfactions

BRITISH ALUMINIUM CO., LTD., London, E.C. (M.S., 30/10/48.) Satisfaction September 17, of Trust Deed registered September 17, 1934.

NORTH BRITISH ALUMINIUM CO., LTD., London, E.C. (M.S., 30/10/48.) Satisfaction September 17, of Trust Deed registered September 17, 1934.

PLASPEX ENGINEERING CO., LTD., Linslade. (M.S., 30/10/48.) Satisfaction September 24, of charge registered June 13, 1946, to the extent of £2000 (land and premises being part of the premises known as 22 Mentmore Road, Linslade, contained in a conveyance dated May 17, 1946, having been released from the charge).

REX PLASTICS, LTD., London, E.C. (M.S., 30/10/48.) Satisfaction September 22, of charge registered March 3, 1947.

JOHN TOWNROE & SONS, LTD., Sheffield. (M.S., 30/10/48.) Satisfaction September 22. £2000, registered July 23, 1947.

Company News

The nominal capital of **Tebu Trading Co., Ltd.**, 35 Queensgate, S.W.7, has been increased beyond the registered capital of £500 to £5000, in £1 ordinary shares.

The nominal capital of **Colloidal Chemists, Ltd.**, 35a Besborough Place, S.W.1, has been increased beyond the registered capital of £5000 to £8000, in £1 ordinary shares.

The nominal capital of **Evolite Plastics, Ltd.**, 325 Latimer Road, W.10, has been increased beyond the registered capital of £1000 to £6000.

New Companies Registered

Baroseal, Ltd. (460,233).—Private company. Capital £500. Manufacturers of adhesives. Subscribers: H. A. Crowe and N. R. A. Crowe. Reg. office: 18 Rex Place, South Street, W.1.

Biopharm Serum Laboratories, Ltd. (12,616).—Private company. Capital £2000. Subscribers: R. N. Eichholz, solicitor, Rebecca Mendelsohn, secretary, both of 46/7 London Wall, London, E.C.2.

R. T. Burley, Ltd. (460,261).—Private company. Capital £5000. Manufacturing chemists. Subscribers: M. R. Cowper, 5 Upper Belgrave Street, S.W.1, and E. Marshall, same address.

French & Scott, Ltd. (459,989).—Private company. Capital £100. Chemical engineers, makers of chemical plant and materials. Directors: F. G. French, P. Scott. Reg. office: 9 Little Portland Street, Regent Street, W.1.

Laboratory Equipment (London), Ltd. (459,813).—Private company. Capital £3000. Manufacturers of hospital, industrial, chemical, scientific, research and laboratory equipment. Subscribers: G. K. Ireland and L. Cork, solicitors, of 20 Copthall Avenue, E.C.2.

Mann & Company (Chemicals), Ltd. (460,136).—Private company. Capital £3000. Manufacturing chemists and drysalters, etc. Subscribers: K. L. Burton and A. L. Snell, 1 St. Andrews Hill, E.C.4.

Plaspacking Ltd. (459,916). — Private company. Capital £1200. Manufacturers of plastic containers and goods of all kinds. Directors: Sir G. Duveen, T. Allen, L. Donn, M.B.E., S. Harvey and A. Krakauer. Reg. office: 28a Basinghall Street, E.C.2.

E. Tarrant Evans & Co., Ltd. (459,372).—Private company. Capital £12,000. To acquire the business carried on by E. T. Evans and E. B. Evans, at 57 Ophir Road, Bournemouth, as E. Tarrant Evans & Co., factors and merchants of glass substitute, protective solutions, and welding compounds and powders, etc. Directors: J. G. Halliday, H. G. Halliday and Mrs. M. I. Halliday, E. T. Evans and E. B. Evans. The three first named are permanent. Reg. office: Bourne Chambers, St. Peter's Road, Bournemouth.

Time Engineers, Ltd. (460,070).—Private company. Capital £2000. Manufacturers of apparatus, chemicals and compositions connected with refrigeration and cold storage, etc. Directors: E. A. James, H. H. Stafford, J. A. Kirk, W. E. Ramsden and W. J. H. James. Reg. office: 27 Castle Drive, Ilford, Essex.

Chemical and Allied Stocks and Shares

LATEST international news and uncertainty aroused by the form of the Government's Bill for steel nationalisation checked the better trend in the market which was developing as a result of the good impression created by over-subscription of the £100 million issue of new 3 per cent Electricity stock. The latter in initial business touched a premium of 7s. 6d. but gilt-edged stocks generally turned slightly easier and leading industrial shares also lost part of earlier gains.

Chemical shares were helped by the White Paper reference to the industry's plans for expansion over the next four or five years. Imperial Chemical touched 48s. before easing to 47s. 9d., and Albright & Wilson 5s. shares moved up to 30s. 3d. helped by the 10 per cent interim dividend. Monsanto Chemicals held their recent rise to 60s., Fisons were firm at 59s., with Amber Chemical 2s. shares at 9s. 6d., and Borax Consolidated kept their rise to 62s. The 4s. units of the Distillers Co. rose to 29s. attention being drawn in the market to the group's important chemical and kindred interests. British Glues & Chemicals 4s. ordinary have been steady at 19s. 9d. Elsewhere, Staveley have fluctuated around 90s. the market still taking the view that although part of the money arising from the projected capital return on its holding in Doncaster Amalgamated Collieries will be used for further expansion of the chemical side of the Staveley business, there may also be a return of capital for Staveley shareholders later on. Laporte 5s. units were 20s. 6d.

British Oxygen have strengthened to £5. British Aluminium kept steady at 47s. 6d., United Molasses were higher at 48s. 9d. British Benzol fluctuated around 95s. 6d. and, awaiting the annual report due shortly, Benzol and By-Products were steadier at 11s. 3d. Asphalt shares reacted on the Anglo-American Asphalt Co.'s statement, but later were inclined to rally. Shares of companies with plastics interests moved narrowly, British Industrial Plastics 2s. shares being 7s., Erinoid 10s., De La Rue 39s., and British Xylonite £5½. British Match were uncertain around 34s. awaiting the interim dividend announcement. Coalite & Chemical 2s. shares turned firmer at 4s. 3d., and Tintex Dyes 2s. shares 3s. 6d.

Iron and steel shares were still inclined to attract speculative support on the hope that the Steel Bill may propose compensation on an assets value basis and not on share values. The latter, it is pointed out, have been affected by the dividend limitation stipulation. Stewarts & Lloyds were good at 59s. 3d., with Dorman Long 24s. 3d., Guest Keen 49s., but United Steel (30s. 9d.) have attracted profit-taking following publication of the results, although they showed profits at a new high level owing to record output. Elsewhere, Tube Investments were £6½. John Brown have risen strongly to 34s. 6d. owing to the company's reported big steel project in Rhodesia. The millions of pounds to be spent on power stations over the next few years gave a fillip to electric equipment shares, G.E.C. strengthening to 88s. 3d., English Electric to 48s. 3d., and Associated Electrical to 75s. 6d. The new export targets helped textile shares, and Calico Printers, following the higher profits announced for the past year, moved up to 20s. 3d.

Babcock & Wilcox at 72s. 6d. held their recent rise. This is one of the big British companies which is regaining control of its Japanese subsidiary. Boots Drug at 56s. have moved up well. British Drug 5s. shares were 9s. 9d., Beechams 18s. 9d. and Sangers 31s. 3d. Glaxo Laboratories were £18¼. Oils have been inclined to strengthen on the big dollar financing arranged for Caribbean Petroleum, a Shell-Royal Dutch subsidiary. Trinidad Leaseholds were firm at 31s. 9d. awaiting the financial results, but Ultramar Oil declined further to 40s. Burmah Oil, on Glasgow buying, moved up to 71s. 3d.

Prices of British Chemical Products

STEADY trading conditions are again reported on the industrial chemicals market, with a persistent demand for most of what may be termed the routine items. Makers are experiencing a steady pressure for deliveries under contract commitments and a number of buyers are already interested in contract replacements. The general buying interest is fairly widespread and not confined to any particular consuming industry, although the need for textile chemicals and dyestuffs is more apparent owing to the relative scarcity of these raw materials. Export trade is well maintained and the volume of inquiry is certainly not less than in recent weeks. With regard to values, there have been no important changes in quotations other than the price adjustments for non-ferrous metal compounds, most of which have already been reported. Business on the coal-tar products market both for home and export remains steady, with no particular feature to record.

MANCHESTER.—From the point of view both of new inquiry and actual order-book additions fairly steady trading conditions have been reported on the Manchester market during the past week. Replacement buying by home users has been on steady lines and shippers have again been in the market in respect of overseas business. There has been an active movement of supplies of soda ash and other alkali products from the works to the consuming end, and a good demand for the full range of potash chemicals available has been reported. There has been little change in the position of the fertiliser materials, buying interest in which is regarded as satisfactory for the time of the year. In the tar products section, steady pressure for supplies of most of the light and heavy materials continues.

GLASGOW.—In the Scottish chemical market busy conditions have continued during the past week, although there are indications that a decrease in the volume of business is to be expected, due to the fact that a number of firms engaged in light engineering are not fully employed. Supplies have been fairly well maintained. It has been noted, however, that a number of firms are stocking up heavily for the winter in case of a repetition of the conditions which prevailed in the winter of 1946/47, when deliveries to Scotland of chemicals from English works were badly delayed. In the export market there has been no change; the position remaining fairly satisfactory.

Price Changes

Rises: Carbon tetrachloride, copper chloride, copper nitrate, lactic acid, lead nitrate, lead acetate, red lead, white lead, zinc oxide.

Reductions: Copper carbonate.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra if packed and delivered in glass.

Acetic Anhydride.—Ton lots, d/d, 11¾d. per lb.

Acetone.—Maximum prices per ton, 1/5 tons, £76 10s.; single drums, £77 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 7½d. per proof gallon; 5000 gal. lots, d/d, 2s. 10¾d. per proof gal.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: £16 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate. — MANCHESTER: £46 per ton d/d.

Ammonium Carbonate.—£48 per ton d/d in 5-cwt. casks. MANCHESTER: Powder, £50 d/d.

Ammonium Chloride. — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Antimony Oxide.—£162 10s. per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—Currently imported at fluctuating rates.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 10s. per ton in casks.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £30; crystals, £31; powdered, £31 10s.; extra fine powder, £32 10s. B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £52; crystals, £53; powdered, £54; extra fine powder, £56. B.P., crystals, £61; powder, £62; extra fine, £64.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £8 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated. £30 per ton.

Chlorine, Liquid.—£29 per ton, d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 5⅝d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 6s. 7d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 7½d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 10½d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 8½d. per lb.

Copper Sulphate.—£42 10s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., from 157s. per 1-2 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £115 per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.

Glycerine.—Chemically pure, double distilled 1260 s.g., 123/1 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale, tech., £80 per ton; dark tech., £70 per ton ex works; barrels returnable.

Lead Acetate.—White, 125s. to 130s. per cwt., according to quantity.

Lead Carbonate.—British dry, ton lots, d/d. £116 10s. per ton.

Lead Nitrate.—About £125 per ton d/d in casks. MANCHESTER: £125.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £127; orange lead, £131. Ground in oil: red, £149 10s., orange, £161 10s. Ready-mixed lead paint: red, £154; orange, £169 10s. (subject to increase of £1 10s. per ton).

Lead, White.—Dry English, in 8-cwt. casks, £136 per ton. Ground in oil, English, in 5-cwt. casks, £157 10s. per ton.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£103 10s. to £106 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 5s.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £27 10s. per ton.

Magnesium Oxide.—Light, commercial, d/d. £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., for 2-cwt. lots, 7s. 6d.; smaller quantities dearer.

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 10d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£128 to £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—Nominal.

Phosphoric Acid.—Technical (S.G. 1.500). ton lots, carriage paid, £61 per ton;

B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9¾d. per lb.; ground, 10¾d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 8d. per lb.; technical, £7 14s. 3d. to £8 6s. 3d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s. 1d. per lb. d/d.

Soda Ash.—58° ex depôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£45 to £47 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £19 15s. per ton.

Sodium Nitrite.—£28-29 per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 5s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £14 12s. 6d. to £16 17s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 10s. 2d. to £7 10s. 2d. per ton; 140° Tw., arsenic-free, £5 2s. 6d. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags), £97 per ton.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £90 5s.; green seal, £89 15s.; red seal, £87 15s.

Zinc Sulphate.—No quotation.

Rubber Chemicals

Antimony Sulphide.—Golden, 3s. to 4s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb, according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

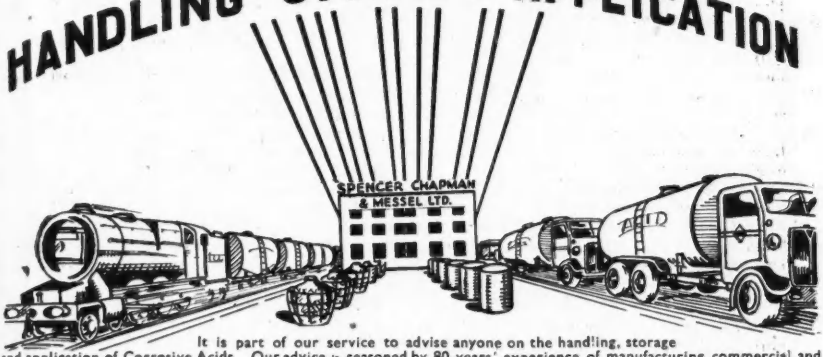
India-rubber Substitutes.—White, 10 5/16d. to 1s. 5¾d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £33 12s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

ACIDS

HANDLING - STORAGE - APPLICATION



It is part of our service to advise anyone on the handling, storage and application of Corrosive Acids. Our advice is seasoned by 80 years' experience of manufacturing commercial and pure acids for every type of industry all over the world. OLEUM - SULPHURIC - BATTERY ACID HYDROCHLORIC - NITRIC DIPPING ACID *and Distilled Water supplied in any quantity.*

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GRAMS BARYCOL

Mineral Rubber, "Rupron."—£20 per ton.
Sulphur Chloride.—7d. per lb.
Vegetable Lamp Black.—£49 per ton.
Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Phosphate.—Not quoted—temporarily unobtainable.
Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in January, £10 5s., rising by 1s. 6d. per ton per month to March, 1948.
Calcium Cyanamide.—Nominal; supplies very scanty.
Concentrated Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £14 18s. 6d.
"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.
Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £17 5s. per ton; granulated, over 98%, £16 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.
Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 3s. 6d. to 4s. 3d. MANCHESTER: Crystals, 10½d. to 1s. 0½d. per lb., d/d; crude, 4s. 3d., naked, at works.
Creosote.—Home trade, 6½d. to 9½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9½d. per gal.
Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.
Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.
Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.
Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.
Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s. MANCHESTER: 17s. 6d. to 21s. per gal.
Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.
Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.
Methyl Acetone.—40/50%, £56 to £60 per ton.
Wood Creosote.—Unrefined, from 3s. 6d per gal., according to boiling range.
Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.
Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.
o-**Cresol** 30/31° C.—Nominal.
p-**Cresol** 34/35° C.—Nominal.
Dichloraniline.—2s. 8½d. per lb.
Dinitrobenzene.—8½d. per lb.
Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.
p-**Nitraniline.**—2s. 5d. per lb.
Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.
Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.
o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.
p-**Toluidine.**—2s. 2d. per lb., in casks.
m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: October 27 (for the period ending October 13 for refined oils). Per ton, naked, ex mill, works or refinery, and subject to additional charges according to package; LINSEED OIL, crude, £200. RAPESEED OIL, crude, £190. COCONUT OIL, crude, £106 refined deodorised, £112 refined hardened deodorised, £116. PALM KERNEL OIL, crude, £105 10s., refined deodorised, £112; refined hardened deodorised, £116. PALM OIL (per ton c.i.f.), in returnable casks, £99 5s.; in drums on loan, £98 15s., in bulk, £97 15s. GROUNDNUT OIL, crude, £110 10s.; refined deodorised, £114, refined hardened deodorised, 40 deg. £118. WHALE OIL, refined hardened, 42 deg., £117; refined hardened, 46/48 deg., £118. ACID OILS, Groundnut, £94; soya, £92; coconut and palm-kernel, £97 10s. ROSIN: Wood, 30s. 6d. to 55s.; gum, 54s. to 60s. per cwt., ex store, according to grade. TURPENTINE, American, 74s. per cwt., Portuguese, 64s. per cwt. in drums or barrels, as imported (controlled price).

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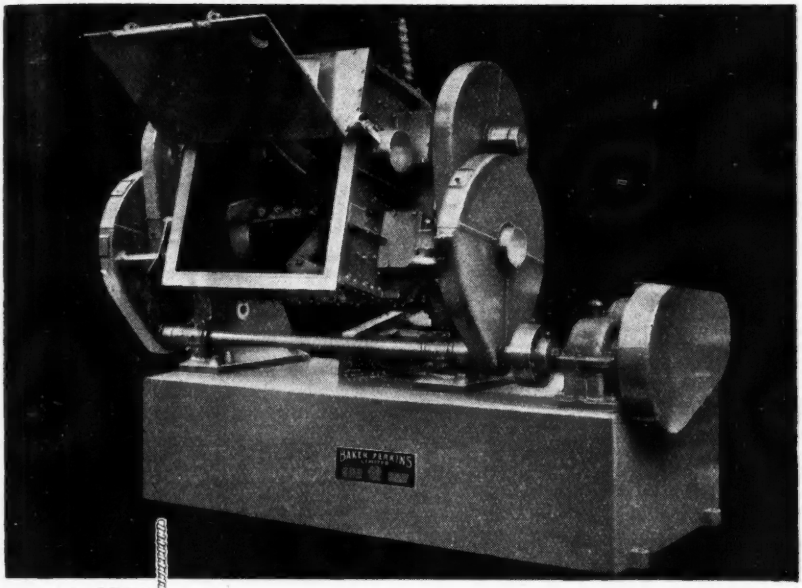

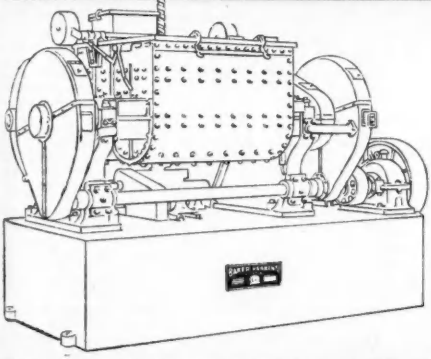

The Universal principle is capable of very many adaptations. Here, for instance, is a special machine for mixing Dry Battery Paste. Trough interior and blades are coated with rubber and renewable blade-shoes of hard metal are fitted.

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

ASSISTANT Chief Chemist required for well-established Chemical Works in N.E. England. First or Second Class Degree an advantage but would not be considered essential. Special consideration given to candidates with experience in Coal Tar Products. Pension scheme available. Applications, in writing, stating salary required, to Works Manager, Box No. 2719, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

FOREMAN with wide experience Superphosphate Manufacture required immediately overseas. Preferably not over 40. Write fully, giving experience, age and wages required, to Box No. 2724. THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

IMPERIAL Chemical Industries Limited require Chemists, Physicists and Chemical Engineers with first or second class honours Degree for research and plant development and plant management work in Widnes and Runcorn. Age not exceeding 35. Salary dependent on age, qualifications and experience. Membership of Staff Pension Fund. Write, giving particulars and quoting R/6, to STAFF MANAGER, Imperial Chemical Industries Limited, General Chemicals Division, Cunard Building, Liverpool, 3.

THE Midland Tar Distillers, Ltd., Oldbury, Birmingham, have vacancies in their research department for Research Chemists with good qualifications and initiative. A good Degree in Chemistry is essential and some industrial research experience is an advantage, but not essential. Applications, in writing, giving full particulars, to THE PERSONNEL MANAGER.

SITUATIONS VACANT

BRITISH ELECTRICITY AUTHORITY
(SOUTH EASTERN DIVISION)

APPLICATIONS are invited for the following positions at the stations indicated.

Horsham Power Station—

(a) **Shift Charge Engineer**

Applicants should have received theoretical training and had experience in the operation of steam power stations and E.H.T. switchgear.

Kingston "B" Power Station—

(b) **Assistant Chemist**

Applicants should possess a degree in Chemistry or be Associate Members of the Royal Institute of Chemistry, and should have had experience in analysis and testing of coal, oil and water. Experience in the problems of boiler fouling and water corrosion would be an advantage.

(c) **Junior Chemist**

Applicants should have had experience in analysis and testing of coal, oil and water.

Applicants for the above positions should be not more than 45 years of age.

Salaries will be in accordance with the National Joint Board Agreement, as follows :—

(a) Class B, Grade VIII : £387 per annum.
(b) Class H, Grade VIIIa : £517 13s. 0d., including 5 per cent. London allowance.
(c) Class H, Grade 10a : £364 7s. 0d. including 5 per cent. London allowance.

Construction work, which is in progress at Kingston "B" Power Station, will bring the salaries (b) and (c) into Class J of the National Joint Board Agreement in the near future.

Forms of application may be obtained by sending a stamped addressed foolscap envelope to the DIVISIONAL SECRETARY, British Electricity Authority, South Eastern Division, British Electricity House, Lower Ham Road, Kingston-on-Thames, Surrey.

Completed application forms, clearly endorsed, must be returned to the above address not later than 20th November, 1948.

PROGRESSIVE established company requires Technical Representative for specialised chemical engineering process. Minimum educational standard, Higher School Certificate or equivalent. Some selling experience desirable. Permanent appointment in Central London office with travel in Great Britain. Generous salary and all expenses. State age, experience and present salary in confidence. Box No. 2720, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

REQUIRED by Argentine exporters, first-class young alert Executive, well experienced and with good connections in the Bone, Fertiliser and Animal By-Products Trade in the U.K. and on the Continent, to manage new branch to be opened shortly in London. Write, giving full particulars, qualifications and references, as well as salary expected, to Box No. 2718, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED—Chemical Engineer for large engineering firm, on the North East coast. State age, full particulars of experience and salary expected, quoting reference "G," applying to Box No. 2728, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WORKING NOTICE

THE Proprietor of British Patent No. 570519, entitled "Production of Butyl Alcohol and Acetone by Fermentation," offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN & CARLBERG, 28, E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

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ONE Pascall Periflo Pin **DISC MILL**, 12 in. diam. disc fast and loose pulley, driven with oscillating feeder. Mill complete with motor driven steel encased chain and bucket elevator 8 ft. centres, buckets, 3 in. by 3 in. by 2 in. on single chain.

Several—2,000 litre (approx. 400 gallons) capacity **EARTHENWARE VESSELS**, approx. 6 ft. by 4 ft. i.d. by approx. 1⅛/1¼ in. thick. Open top with loose lid. Two 2 in. inlets with domed cover. Vessel arranged one 1½ in. bottom side outlet.

Several—3,000 litre (approx. 600 gallons) capacity **EARTHENWARE VESSELS**, approx. 6 ft. 6 in. high by 4 ft. 9 in. i.d. by approx. 2 in. thick. Open top fitted with loose fitting cover. Having approx. 9 in. centre hole with loose lid. Two 2 in. inlets in dome cover. Arranged with one 1½ in. side outlet.

Two—Horizontal cylindrical dish ended **NICKEL VESSELS**, 6 ft 6 in. long by 4 ft. diam. by 16 s.w.g. mounted in mild steel and cast iron cradle by Arthur Krupp of Germany, stamped for pressure of 2.1 atmospheres. Reinforced oval manhole, 1 ft. 6 in. by 1 ft. 2 in. with inswinging hinged cover hand wheel locking at one end 2 in. outlet with plugcock and 2 in. block at manhole end. 2 in. pad runoff at bottom end. 2½ in. inlet with 1 in. branch at top. Each vessel complete with level indicator.

One—Horizontal "U" shaped **TROUGH MIXER** by Pascall, approx. 5 ft. long by 2 ft. wide by 2 ft. deep, with spiral agitator fast and loose pulley driven. Trough with 5 in. sq. slide bottom outlet.

One—Vacuum **EVAPORATING PLANT** by Morton, comprising tinned copper pan approx. 8 ft. overall depth by 5 ft. i.d. Steam jacketed with internal steam coil of 3 in. o.d. solid drawn copper pipe, complete with condenser and vacuum pump. Evaporator capacity 300 gallons per hour.

One—**VACUUM OVEN** of cast iron construction of Pasburg type, ext. dims. 7 ft. 2 in. high by 4 ft. 9 in. wide by 5 ft., int. dims. 5 ft. 9 in. high by 4. ft. 2 in wide by 3 ft. 8 in. 16 welded steel steam heated shelves, each carrying perforated tray, 3 ft. 4 in. by 2 ft. 2½ in. by ½ in. deep. Heavy hinged swing door with four securing clamps. 7 in. glass inspection port in door and similar port in back of oven. Space between each shelf, 2½ in. Complete with vacuum pump by Vegelin & Hubner or Halle and condenser.

One—glass-lined steam jacketed **EVAPORATING PAN** by Pfaulder. Overall size, 2 ft. 3 in. diam. i.d. 37 in. by 10 in. deep. Capacity approx. 20 gallons. Fitted 1 in. steam inlet and outlet. Working pressure of jacket 30 lb. per sq. in., test pressure 45 lb. per sq. in. Mounted on three legs complete with close fitting lid.

Two—Vertical cylindrical mild steel riveted, steam jacketed **MIXERS**, 5 ft. diam. by 4 ft. 3 in. deep by ⅜ in. plate. dished bottom. At present arranged as one twin unit. Each with vertical agitator shaft carrying two paddle agitators, running in footstep bearing, overdriven through bevel gears mounted on single horizontal shaft. Two baffles fitted to each Mixer and one 2 in. bottom centre outlet. Usual steam connections.

One—Duplex **MIXING and KNEADING MACHINE** by Morton of Wishaw. Steam jacketed through approx. 42 in. by 38 in. by 30 in. Fitted twin gunmetal mixing blades double Nabel type, counterbalanced jacketed lid secured by four quick release clamps. Suitable for internal working pressure of 15 lb. per sq. in. or high vacuum. Bower operated tilting, mixing blades driven by gearing fitted at both ends, forward and reverse pulleys.

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BROADBENT 48-in. HYDRO EXTRACTOR, vulcanised basket, electrically underdriven 3-point suspension. Complete with starting equipment, fitted reverse current braking switch.

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BROADBENT 48-in. SUSPENDED TYPE HYDRO EXTRACTOR, overdriven from 15 h.p. motor, 400/3/50 supply, together with Pony motor for slow running.

JOHNSON TIMBER PLATE AND FRAME FILTER PRESS, having 29 plates and 30 frames forming cakes 3 ft. 3 in. by 1 ft. 10 in. by 1 in. Hydraulic closure. (Now working.)

JOHNSON TIMBER PLATE AND FRAME FILTER PRESS, 28 plates and 29 frames, cakes 2 ft. 1 in. square by 1½ in. closure. (Two available.)

18-in. diam. WILKINSON OINTMENT MILL, with marble refining discs and enamelled hopper and agitator, and complete with driving motor.

TUNGSTONE ACID PUMPS. A number available in Ebonite, Bronze, and Tufnol.

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ARTOFEX Dough Mixer; 15 ft. Bucket Elevator; Jacketed Filter Press; Jacketed Heavy Dough Mixer, 300 lb.; Four Roll Granite Refiner; 6 Roll Steel Refiner.

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CO_2 Plant; Compressors by J. & E. Hall; motorised A.C. supply; new condition. Details and prices, J. F., C. S., LTD., Staffa Road, E.10.

DISINFECTORS Two 8 ft. by 5 ft. diam. jacketed Four 7 ft. by 3 ft. diam. with coils, Two Oval 50 in. by 30 in. by 7 ft. jacketed. New condition. THOMPSON & SON (MILLWALL) LTD., Cuba Street, London, E.14. Tel. East 1844.

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GET a JUMBO on the job. This revolutionary machine drives like a car, lifts 2½ tons at the touch of a finger tip, hydraulically shovels coal, coke and similar materials, levels and sweeps stock piles, stacks packing cases—in fact, there is nothing else like it. Get particulars from:—

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ROTARY VACUUM FILTER

Drum cell type. 4 ft. 7½ in. diameter × 2 ft. 7½ in. wide. Filter surface 35 sq. ft. 2 h.p. 4-speed motor with starter. Makers, International Combustion Co, Ltd. Brand new condition £1,350

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64 Fountain St., Manchester
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MORTON, SON & WARD LTD.
—OFFER—
CHEMICAL PLANT

ONE—Twin pan Mixer by G.M.S., with 30 gallon capacity pans, 2 ft. dia. by 1 ft. 9 in. deep, rise and fall operation, overdriven stirring gear. (New condition.)
FOUR—40 gallon steam jacketed Mixers, 2 ft. dia. by 2 ft. deep, welded mild steel, 50 lb. per sq. in. w.p. Overdriven stirring gear. (Unused.)
ONE—200 gallon unjacketed welded M.S. Mixer, 3 ft. dia. by 4 ft. 6 in. deep with overdriven stirring gear. (Unused.)
TWO—4-pot stainless steel ball grinding Mills, with two containers, 1 ft. 2 in. dia. by 1 ft. 3 in. long and two 9 in. dia. by 10 in long, driven through vee ropes from new 2 h.p. Laurence Scott Motors, with Igranic starters, 400/3/50 cycles supply. (New condition.)
TEN—2 in. Regulus metal acid Valves, straight through pattern with standard flanges and stainless fittings. (New condition.)
SIX—3 in. Regulus metal acid valves, straight through pattern with standard flanges and stainless fittings. (New condition.)
ONE—21,000 g.p.h. against 52 ft. head "Vacseal" vulcanite lined centrifugal acid pump, direct coupled to 15 h.p. E.E.C. enclosed motor with oil immersed Ellison Starter and ammeter. 400/3/50 cycles.

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WALK MILL, DOBCROSS, Nr. OLDHAM, LANCS.
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"JOHNSON" Filter Press with 24 cast iron recessed plates; 26 in. diam. by 1 in. cake.
"Johnson" all-metal Filter Press Pump, 2 plungers 2½ in. diam. by 5 in. stroke, belt drive.
"Hoffman" pressure Filters with motorised pump 400/3/50, up to 120 galls. per minute.
Horizontal multi tubular Condensors with 188 brass tubes ¾ in. diam. by 5 ft. 2 in. long.
Vacuum Pump by "Passborg," double-acting single cylinder 12 in. diam. by 10 in. stroke, belt drive.
"Manlove" steam-driven Wet Vacuum Pump, cylinder 10 in. by 9 in., steam cylinder 8 in. diam. by 9 in. stroke.
80-Kilowatt Electric Furnace, chamber 4 ft. diam. by 15 ft. long, all equipment, unused.
Geared Motors, 15, 4, 2½ and 1 h.p., 400/3/50.
Motors, 3, 5, 7½, 10, 20 and 50 h.p., 400/3/50.
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